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SELECTED WATER RESOURCES ABSTRACTS

VOLUME 8, NUMBER 15
AUGUST 1, 1975

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U.S. DEPARTMENT OF THE INTERIOR
OFFICE OF WATER RESEARCH AND TECHNOLOGY

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Rev. Oct. 1974

SELECTED
WATER RESOURCES ABSTRACTS

A Semimonthly Publication of the Water Resources Scientific Information Center,
Office of Water Research and Technology, U.S. Department of the Interior

VOLUME 8, NUMBER 15
AUGUST 1, 1975

W75-07351 -- W75-07850

The Secretary of the U. S. Department of the Interior has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through August 31, 1978.

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

FOREWORD

Selected Water Resources Abstracts, a semimonthly journal, includes abstracts of current and earlier pertinent monographs, journal articles, reports, and other publication formats. The contents of these documents cover the water-related aspects of the life, physical, and social sciences as well as related engineering and legal aspects of the characteristics, conservation, control, use, or management of water. Each abstract includes a full bibliographical citation and a set of descriptors or identifiers which are listed in the **Water Resources Thesaurus.** Each abstract entry is classified into ten fields and sixty groups similar to the water resources research categories established by the Committee on Water Resources Research of the Federal Council for Science and Technology.

WRSIC IS NOT PRESENTLY IN A POSITION TO PROVIDE COPIES OF DOCUMENTS ABSTRACTED IN THIS JOURNAL. Sufficient bibliographic information is given to enable readers to order the desired documents from local libraries or other sources.

Selected Water Resources Abstracts is designed to serve the scientific and technical information needs of scientists, engineers, and managers as one of several planned services of the Water Resources Scientific Information Center (WRSIC). The Center was established by the Secretary of the Interior and has been designated by the Federal Council for Science and Technology to serve the water resources community by improving the communication of water-related research results. The Center is pursuing this objective by coordinating and supplementing the existing scientific and technical information activities associated with active research and investigation program in water resources.

To provide WRSIC with input, selected organizations with active water resources research programs are supported as "centers of competence" responsible for selecting, abstracting, and indexing from the current and earlier pertinent literature in specified subject areas.

Additional "centers of competence" have been established in cooperation with the Environmental Protection Agency. A directory of the Centers appears on inside back cover.

Supplementary documentation is being secured from established discipline-oriented abstracting and indexing services. Currently an arrangement is in effect whereby the BioScience Information Service of Biological Abstracts supplies WRSIC with relevant references from the several subject areas of interest to our users. In addition to Biological Abstracts, references are acquired from Bioresearch Index which are without abstracts and therefore also appear abstractless in SWRA. Similar arrangements with other producers of abstracts are contemplated as planned augmentation of the information base.

The input from these Centers, and from the 51 Water Resources Research Institutes administered under the Water Resources Research Act of 1964, as well as input from the grantees and contractors of the Office of Water Research and Technology and other Federal water resource agencies with which the

Center has agreements becomes the information base from which this journal is, and other information services will be, derived; these services include bibliographies, specialized indexes, literature searches, and state-of-the-art reviews.

Comments and suggestions concerning the contents and arrangements of this bulletin are welcome.

Water Resources Scientific Information Center
Office of Water Research and Technology
U.S. Department of the Interior
Washington, D. C. 20240

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Includes the following Groups: General; Precipitation; Snow, Ice, and Frost; Evaporation and Transpiration; Streamflow and Runoff; Groundwater; Water in Soils; Lakes; Water in Plants; Erosion and Sedimentation; Chemical Processes; Estuaries.

03 WATER SUPPLY AUGMENTATION AND CONSERVATION
Includes the following Groups: Saline Water Conversion; Water Yield Improvement; Use of Water of Impaired Quality; Conservation in Domestic and Municipal Use; Conservation in Industry; Conservation in Agriculture.

04 WATER QUANTITY MANAGEMENT AND CONTROL
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06 WATER RESOURCES PLANNING
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ABSTRACT SOURCES

SELECTED WATER RESOURCES ABSTRACTS

1. NATURE OF WATER

1B. Aqueous Solutions and Suspensions

COOPERATIVE PHENOMENA IN ISOTOPIC HYDRODYNAMIC DISPERSION,
Nevada Univ., Reno. Desert Research Inst.
For primary bibliographic entry see Field 5B.
W75-07725

2. WATER CYCLE

2A. General

NONSTATIONARY MODEL OF THE TRANSFORMATION OF EFFECTIVE PRECIPITATION INTO RUNOFF,
S. A. Rusin.
Soviet Hydrology, Selected Papers No. 4, p 289-300, 1973. 6 fig, 8 ref. Translated from Transactions of the State Hydrologic Institute (Trudy GGI), No. 211, p 88-104, 1973.

Descriptors: *Rainfall-runoff relationships, *Runoff, *Mathematical models, Mathematical studies, Surface runoff, Precipitation(Atmospheric), Basins, Model studies, Hydrographs, Optimization, Floods.
Identifiers: Volkha-Verkhniy basin(USSR), Glukhovka-Mostovoy basin(USSR).

Optimization methods were used in solving the so-called inverse problem, i.e., the function describing how precipitation is transformed into runoff given effective precipitation and an outlet hydrograph. The solution involved construction of a direct runoff velocity curve during a flood period. Data from the Volkha-Verkhniy and Glukhovka-Mostovoy basins show the curve of direct runoff speed to be fairly stable for a specific drainage area. It increased to a maximum value (in advance of maximum discharge) before decreasing to form a tail or recession limb. (Jess-ISWS)
W75-07437

A GLOBAL OCEAN-ATMOSPHERE CLIMATE MODEL. PART I. THE ATMOSPHERIC CIRCULATION,
National Oceanic and Atmospheric Administration, Princeton, N.J. Geophysical Fluid Dynamics Lab.
S. Manabe, K. Bryan, and M. J. Spelman.
Journal of Physical Oceanography, Vol 5, No 1, p 3-29, January 1975. 19 fig, 1 tab, 40 ref, 1 append.

Descriptors: *Model studies, *Climates, *Atmospheric physics, *Oceans, Water balance, Temperature, Heat balance, Circulation, Fourier analysis, Time, Radiation, Convection, Condensation, Hydrology, Momentum transfer, Equations, Mixing, Finite element analysis, Precipitation(Atmospheric).
Identifiers: Global grid, Heat exchange, Momentum exchange, Water exchange, Zonal wind, Meridonal circulation, Sea level pressure.

A joint ocean-atmosphere model covering the entire globe was constructed at the Geophysical Fluid Dynamics Laboratory of NOAA. This model differed from the earlier version of the joint model of Bryan and Manabe both in global domain and inclusion of realistic rather than idealized topography. The structure of the atmospheric portion of the joint model was described and the atmospheric circulation and climate that emerged from the time integration of the model was discussed. The primitive equations of motion were incorporated in a spherical coordinate system. The numerical problems associated with the treatment of mountains were minimized by using the 'sigma' coordinate system in which pressure, normalized by surface pressure, was the vertical coordinate. For vertical finite differencing, nine levels were chosen to represent the planetary boundary layer and the stratosphere as well as the troposphere. In order to identify the effect of the ocean currents upon climate, the joint model climate was compared with another climate obtained from the time integration of an 'A-model' in which oceanic regions were occupied by wet swampy surfaces without any heat capacity. The results showed that the total poleward transport of energy was affected little by the oceanic heat transport. Further comparison between the two models indicated that ocean currents significantly affect not only the horizontal distribution of surface temperature of both oceans and continents but also the global distribution of precipitation. (See also W75-07447) (Roberts-ISWS)
W75-07446

A GLOBAL OCEAN-ATMOSPHERE CLIMATE MODEL. PART II. THE OCEANIC CIRCULATION,
National Oceanic and Atmospheric Administration, Princeton, N.J. Geophysical Fluid Dynamics Lab.
K. Bryan, S. Manabe, and R. C. Pacanowski.
Journal of Physical Oceanography, Vol 5, No 1, p 30-46, January 1975. 12 fig, 6 tab, 34 ref, 2 append.

Descriptors: *Numerical analysis, *Oceans, *Atmosphere, *Climates, Stratification, Heat balance, Sea ice, Surface waters, Water balance, Temperature, *Model studies, Circulation, Atmospheric physics, Fourier analysis, Time, Radiation, Convection, Condensation, Hydrology, Momentum transfer, Salinity, Distribution, Equations, Mixing, Finite element analysis, Topography.
Identifiers: Poleward, Pack ice, Zonal wind, Trade wind belt, Ekman drift, Global grid, Radiative transfer, Heat exchange, Momentum exchange, Water exchange, Meridonal circulation, Sea level pressure, Thermohaline.

A numerical experiment was carried out with a joint model of the ocean and atmosphere. The 12-level model of the world ocean predicted the fields of horizontal velocity, temperature, and salinity. It included the effects of bottom topography and a simplified model of polar pack ice. The numerical experiment allowed the joint ocean-atmosphere model to seek an equilibrium over the equivalent of 270 years in the ocean time scale. The initial state of the ocean was uniform stratification and complete rest. Although the final temperature distribution was more zonal than it should be, the major western boundary currents and the equatorial undercurrent were successfully predicted. The calculated salinity field had the correct observed range, and correctly indicated that the Atlantic is more salty than the Pacific. The poleward heat transport of the model was very sensitive to the strength of the circulation in the vertical-meridonal plane. The heat transport was strongest in the trade wind belt where Ekman drift and thermohaline forces acted together to cause a net flow of surface water toward the poles. The results suggested that seasonal effects must be included in any future studies to test the full potential of a joint atmosphere-ocean climate model. (See also W75-07446) (Roberts-ISWS)
W75-07447

VERIFICATION OF NUMERICAL MODELS OF LAKE ONTARIO. II. STRATIFIED CIRCULATIONS AND TEMPERATURE CHANGES,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 2H.
W75-07462

WATER RESOURCES,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
For primary bibliographic entry see Field 7B.
W75-07501

HYDROLOGIC IMPACT OF WATER MODIFICATION,
Agricultural Research Service, Chickasha, Okla.
For primary bibliographic entry see Field 3B.
W75-07505

SOME SEDIMENT ASPECTS OF TROPICAL STORM AGNES,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 2J.
W75-07557

A SPECIAL PLANNING TECHNIQUE FOR STREAM-AQUIFER SYSTEMS,
Geological Survey, Denver, Colo.
C. T. Jenkins, and O. J. Taylor.
Open-file report No 74-242, 1974. 16 p, 4 fig, 1 tab, 20 ref.

Descriptors: *Surface-groundwater relationships, *Mathematical models, *Planning, Model studies, Water yield, Aquifer characteristics, Water management(Applied), Conjunctive use, Analog models, Computer models.
Identifiers: *Stream-aquifer systems.

The potential effects of water-management plans on stream-aquifer systems may be simulated using electric-analog or digital-computer models. Many of the electric-analog models require large amounts of hardware. Digital-computer models require no special hardware preparation but often they require so many repetitive solutions of equations that they result in calculations that are unduly unwieldy and expensive, even on the latest generation of computers. Further, the more detailed digital models require a vast amount of core storage. A concept that offers a solution to these problems is that the effects on streamflow of groundwater withdrawal or recharge (stress) at any point in such a system can be approximated using two classical equations and a value of time that reflects the integrated effect of the following: irregular impermeable boundaries; stream meanders; aquifer properties and their areal variations; distance of the point from the stream; and imperfect hydraulic connection between the stream and the aquifer. The value of time is called the stream depletion factor (sdf). Results of a relatively few tests on detailed models can be summarized on maps showing lines through points of equal sdf. Simple arithmetic, using only a slide rule and charts or tables of dimensionless values, will be sufficient for many calculations. If a large digital computer is available, detailed description of the system and its stresses will require only a fraction of the core storage, leaving the greater part of the storage available for sophisticated analyses, such as optimization. (Knapp-USGS)
W75-07584

PROJECT AQUA NORWEGIAN IB (INTERNATIONAL BIOLOGICAL PROGRAM)/PF, (IN NORWEGIAN),
Zoologisk Museum, Oslo (Norway).
L. Lien.
Fauna (Oslo). Vol 26, No 2, p 104-111. 1973, Illus, English summary.

Descriptors: Fresh water, Europe, Brackish water, *Geographical areas.
Identifiers: Project Aqua, *Norway, Inland waters.

The purpose of Project Aqua is to prepare an international list of freshwater and brackish water areas which are of importance for research and

education. A preliminary list of Norwegian Project Aqua-sites is given, and their geographical location is shown. The Norwegian list is based on information given by institutions and scientists working with problems connected with inland waters.--Copyright 1974, Biological Abstracts, Inc.
W75-07749

2B. Precipitation

WATER RESOURCE OBSERVATORY WIND AND SOLAR RADIATION DATA WATER YEARS 1973 AND 1974,
Wyoming Univ., Laramie. Water Resources Research Inst.
For primary bibliographic entry see Field 7C.
W75-07354

A COMPARISON OF INFRARED IMAGERY AND VIDEO PICTURES IN THE ESTIMATION OF DAILY RAINFALL FROM SATELLITE DATA,
National Environmental Satellite Service, Washington, D.C.
Available from the National Technical Information Service, Springfield, Va. 22161. NOAA Technical Memorandum NESS 62, January 197.

Descriptors: *Precipitation(Atmospheric), *Rainfall intensity, Meteorology, Precipitation intensity, Rain, Rates, Rainfall disposition, Distribution patterns, Satellites(Artificial), Data collections, *Remote sensing, Weather forecasting, Southeast U.S.
Identifiers: *Infrared imagery, *Video pictures, *Rainfall estimation techniques.

An empirical method of estimating 24-hr rainfall in the tropics and subtropics us5. 14 p, 10 fig, 7 tab, 3 ref. (NOAA-75031102)ing both satellite video pictures and infrared imagery was tested to determine whether comparable results could be obtained. This method was tested for Alabama, Georgia, and South Carolina for the months of July, August, and September 1973. The infrared data set provided approximately the same degree of accuracy as the video data set, and the mean of the estimates from the two data sets provided additional accuracy. Seven-day-running totals of these mean estimates coincided closely with 7-day-running totals of observed rainfall. The rainfall estimation technique applies best to humid tropical convective storm areas. (NOAA)
W75-07422

COMPATIBILITY OF LOW-CLOUD VECTORS AND RAWINS FOR SYNOPTIC SCALE ANALYSIS,
National Environmental Satellite Service, Washington, D.C.
L. F. Hubert, and L. F. Whitney, Jr.
Available from Superintendent of Documents, U.S. Gov't Printing Office Washington, D.C. 20402, as C55.13:NOAA TR NESS 70, for $0.75. NOAA Technical Report NESS 70, October 1974. 26 p, 9 fig, 3 tab, 10 ref. (NOAA-74121804)

Descriptors: *Meteorological data, *Clouds, *Weather data, Pacific Ocean, Satellites(Artificial).
Identifiers: *Meteorological satellites, *Synoptic scale analysis, *Cloud vectors, Geosynchronous satellite data, Rawin observations, Wind data.

Low-cloud motions derived by both manual and computer techniques from geosynchronous satellite data and rawin observations are analyzed in various combinations for a two-part analysis compatability experiment. Since the true air motion is unknown, compatibility rather than absolute accuracy of these three data sets was examined. Two important points were brought out: (1) Increased density and better distribution of wind data provided by geosynchronous satellites control analyses so that severe editing is unnecessary (i.e., good data distribution and density overcome the effect of a few bad data), and (2) the analyses illustrate a shortcoming of these satellite wind data. Since low-cloud vectors are obtained only at the periphery and not within disturbances, the intensity of disturbances is under-estimated. Availability of infrared data from geosynchronous satellites will increase the number of middle- or high-cloud vectors in or near these disturbances. These additional vectors may aid in better depicting the intensity of disturbances. (NOAA)
W75-07424

DROUGHT IN THE SAHARA: A BIOGEOPHYSICAL FEEDBACK MECHANISM,
Massachusetts Inst. of Tech., Cambridge. Dept. of Meteorology.
J. Charney, P. H. Stone, and W. J. Quirk.
Science, Vol 187, No 4175, p 434-435, February 7, 1975. 2 fig, 7 ref.

Descriptors: *Droughts, *Albedo, Rainfall, Subsidence, Climates, Grazing, Biology, Geophysics, Vegetation.
Identifiers: *Sahara, Biosphere.

Two integrations of a global circulation model, differeing only in the prescribed surface albedo in the Sahara, showed that an increase in albedo resulting from a decrease in plant cover caused a decrease in rainfall. Thus any tendency for plant cover to decrease would be reinforced by a decrease in rainfall, and could initiate or perpetuate a drought. The amount of overgrazing was correlated with the droughts in the southern region of the Sahara. Thus a decrease in plant cover may be accompanied by an increase in surface albedo. This would lead to a decrease in the net incoming radiation and an increase in the radiative cooling of the air. As a consequence, the air would sink to maintain thermal equilibrium by adiabatic compression, and cumulus convection and its associated rainfall would be suppressed. (Roberts-ISWS)
W75-07430

A GLOBAL OCEAN-ATMOSPHERE CLIMATE MODEL. PART I. THE ATMOSPHERIC CIRCULATION,
National Oceanic and Atmospheric Administration, Princeton, N.J. Geophysical Fluid Dynamics Lab.
For primary bibliographic entry see Field 2A.
W75-07446

ICE FALLOUT IN CONVECTIVE STORMS,
Commonwealth Scientific and Industrial Research Organization, Aspendale (Australia). Div. of Atmospheric Physics.
For primary bibliographic entry see Field 2C.
W75-07456

THE TOTAL WATER CONTENT OF CLOUDS IN THE SOUTHERN HEMISPHERE,
F. Loewe.
Australian Meteorological Magazine, Vol 22, No 1, p 19-20, March 1974. 3 tab, 1 ref.

Descriptors: *Clouds, *Water balance, *Precipitable water, Atmosphere, Water vapor, Ice, Water, Cloud cover.
Identifiers: *Southern Hemisphere, Cloud thickness, *Water content(Clouds).

Starting from estimates of the precipitable water held in the Southern Hemisphere as given by Newton, an estimate was made of the amount of water substance held as ice and liquid water in clouds. Cloud cover and thickness estimates also came from Newton. The calculations resulted in an estimate of 146 megatons of water substance contained in the clouds over the Southern Hemisphere. This is only 2.7% of the total water vapor content, 5400 megatons, and is considered negligible in large-scale considerations of the atmospheric water balance. (Jones-ISWS)
W75-07457

THE LIFE CYCLE OF VALLEY FOG. PART I: MICROMETEOROLOGICAL CHARACTERISTICS,
Calspan Corp., Buffalo, N.Y.
R. J. Pilie, E. J. Mack, W. C. Kocmond, C. W. Rogers, and W. J. Eadie.
Journal of Applied Meteorology, Vol 14, No 3, p 347-363, April 1975. 18 fig, 2 tab, 20 ref.

Descriptors: *Fog, *Valleys, *Meteorology, Temperature, Dew point, Towers, Winds, Radiation, Dew, Evaporation, Aircraft, Heat transfer, Circulation, Saturation, *New York.
Identifiers: *Ground fog, *Valley fog, Visibility, Divergence, Inversion, *Chemung River Valley(NY).

Extensive measurements were made of micrometeorological variables associated with eleven fogs in the Chemung River Valley near Elmira, New York. Temperature was measured at five levels on a 17 m tower, dew point at three levels, wind speed and direction at two levels, and net radiation and vertical wind at one level. Visibility was measured at three locations, and dew deposition and evaporation at one location near the surface. Vertical temperature distributions were also measured with use of an aircraft. To explain observed temperature behavior (maximum cooling rate near 100 m in the 6 h preceeding fog) and the initial formation of a thin fog layer slightly below that level, it seemed necessary to invoke Defant's model of valley circulation. Radiation divergence at the fog layer aloft then produces an inversion near the fog top and unstable conditions at lower levels. The fog base therefore propagates downward. Dew deposition is responsible for formation of a low-level dew point inversion before fog forms, a necessary condition for initial fog formation aloft. The inversion breaks as fog forms and dew weight is constant from that time until sunrise. Evaporation of dew after sunrise maintains saturation throughout the fog depth as fog temperature increases, and is therefore responsible for fog persistence. (See also W75-07460) (Jones-ISWS)
W75-07459

THE LIFE CYCLE OF VALLEY FOG. PART II: FOG MICROPHYSICS,
Calspan Corp., Buffalo, N.Y.
R. J. Pilie, E. J. Mack, W. C. Kocmond, W. J. Eadie, and C. W. Rogers.
Journal of Applied Meteorology, Vol 14, No 3, p 364-374, April 1975. 13 fig, 1 tab, 7 ref.

Descriptors: *Fog, *Valleys, *Cloud physics, *Meteorology, Haze, Saturation, Supersaturation, Turbulence, Diffusion, Drops(Fluids), Particle size, Nucleation, Clouds, Moisture content, *New York.
Identifiers: *Ground fog, *Valley fog, Visibility, Drop-size distribution, *Chemung River Valley(NY).

Extensive measurements were made of the microphysics of valley fog in the Chemung River Valley near Elmira, New York. Data on drop size distributions, drop concentrations, liquid water contents, and haze and cloud nucleus concentrations obtained on eight fog nights were discussed. Shallow ground fog usually occurs prior to the formation of deep valley fog. The data show that ground fog is characterized by droplet concentrations of 100 to 200 per cu cm in the 1 to 10 micrometer radius range with mean radii of 2 to 4 micrometers. As deep fog forms aloft, droplet concentration near the surface decreases to less than 2 per cu cm and the mean radius increases from 6 to 12 micrometers. Droplets of radii less than 3

micrometers disappear. Droplet concentration and liquid water content increase gradually until the first visibility minimum at the surface when typical values range from 12 to 25 per cu cm and 50 to 150 mg per cu m, respectively. The small droplets reappear at first visibility minimum. Bimodal drop size distributions occur in approximately half of the fogs with one mode at 2-3 micrometer radius and a second mode between 6 and 12 micrometers. Aloft, drop size distributions become narrower and the mean radius decreases with increasing altitude and increasing age of fog. The cloud nucleus concentration active at S = 3% is usually between 800 and 1000 per cu cm near the surface and decreases to 500-800 per cu cm at 300 m. (See also W75-07459) (Jones-ISWS)
W75-07460

A NEW HOT-WIRE LIQUID CLOUD WATER METER,
National Hurricane Research Lab., Coral Gables, Fla.
F. J. Merceret, and T. L. Schricker.
Journal of Applied Meteorology, Vol 14, No 3, p 319-326, April 1975. 5 fig, 10 ref.

Descriptors: *Instrumentation, *Clouds, *Moisture content, Drops(Fluids), Thermal conductivity, Viscosity, Water, Evaporation, Temperature, Electricity, Raindrops, Calibrations, Particle size.
Identifiers: *Hot-wire meter, Vaporization heat.

The National Hurricane Research Laboratory has developed and flight tested a new airborne liquid water meter for cloud physics measurements. The sensor is maintained at constant temperature rather than at constant current, and the operating temperature is held well below the in-situ boiling point. These two changes from previous instruments, such as the popular Johnson-Williams meter, permit accurate response over a wider range of drop sizes and finer spatial resolution. Flight tests on NOAA Research Flight Facility aircraft showed the new unit to be more sensitive, more stable, and more rapidly responding than the J-W and Levine instruments presently on board. (Jones-ISWS)
W75-07461

ESTIMATING EVAPOTRANSPIRATION BY HOMOCLIMATES,
Geological Survey, Lubbock, Tex.
For primary bibliographic entry see Field 2D.
W75-07576

FORMULATING CONVERSION TABLES FOR STICK-MEASURE OF SACRAMENTO PRECIPITATION STORAGE GAGES,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 7B.
W75-07654

PROBABILITY OF SEQUENCES OF WET AND DRY DAYS FOR TENNESSEE,
Tennessee Univ., Knoxville. Dept. of Plant and Soil Science.
J. M. Safley, Jr., H. A. Fribourg, J. V. Vaiksnoras, and R. H. Strand.
Available from the National Technical Information Service, U.S. Dept. of Commerce, Springfield, Va 22161. NOAA Technical Memorandum EDS 22, December 1974. 73 p, 1 fig, 67 tab, 8 ref.

Descriptors: *Precipitation(Atmospheric), *Rainfall, *Probability, Climates, *Tennessee, Seasonal.
Identifiers: *Precipitation patterns, Initial probabilities, Transitional probabilities, Seasonal precipitation, Long-term weather observations, Daily forecasts, Frequencies of occurrence.

Probabilities of sequences of wet and dry days can be used in evaluating probable gains or losses related to many activities. Both initial and transitional probabilities can be calculated from past, long-term weather observations. Initial probabilities indicate the likelihood that any day during a week will be dry, without reference to rainfall on previous days. Transition probabilities predict the probability of a day being dry if the previous day was also dry or if the previous day was wet. Tables of these probabilities are presented for sixty-seven locations in Tennessee for five levels of daily precipitation, ranging from 0.01 to 0.50 inch per day. (NOAA)
W75-07721

THE RAINFALL INTERCEPTION PROCESS AND MINERAL CYCLING IN A MONTANE RAIN FOREST IN EASTERN PUERTO RICO,
Puerto Rico Nuclear Center, San Juan. Terrestrial Ecology Program.
For primary bibliographic entry see Field 2K.
W75-07727

A KINEMATIC ANALYSIS OF TROPICAL STORM BASED ON ATS CLOUD MOTIONS,
Chicago Univ., Ill. Dept. of the Geophysical Sciences.
T. T. Fujita, and J. J. Tecson.
SMRP Research Paper No. 125, August 1974. 20 p, 11 fig, 2 tab, 9 ref. SMRP Research Paper No. 125.
NOAA Grant 04-3-022-8.

Descriptors: *Hurricanes, *Storm structure, *Tropical cyclones, *Cloud physics, *Wind velocity, Atlantic Ocean, Wind pressure, Air circulation, Weather patterns, Tropical regions, *Remote sensing.
Identifiers: *Applications Technology Satellite(ATS III), *Tropical storm Anna, Cross-equatorial flow, North Hemisphere trades.

The asymmetric structure of an incipient storm in the Atlantic Ocean is determined, using low-cloud velocities computed from the Applications Technology Satellite (ATS III) picture sequences. The investigation concerns the kinematic analysis of tropical storm Anna during July 26, 27, and 28, 1969 when it intensified into tropical storm stage in the vicinity of 10 deg N and 35 deg W, reportedly late on the 27th. The cross-equatorial flow from the southern hemisphere was responsible for providing the inflow to the storm while the northern hemisphere trades supplied the major contribution to the circulation around the storms. The inflow from the southern sector of the disturbance and the over-all circulation increased as the storm intensified. (NOAA)
W75-07824

LAKE ONTARIO BASIN: OVERLAND PRECIPITATION, 1972-73,
National Oceanic and Atmospheric Administration, Ann Arbor, Mich. Great Lakes Environmental Lab.
D. C. Norton.
NOAA Technical Memorandum ERL GLERL-1, March 1975, 18 p.

Descriptors: *Precipitation(Atmospheric), *Precipitation gages, *Lake Ontario, Isohyets, Mapping, Probable maximum precipitation, Rainfall, Sleet, Snowfall, Climatology, Great Lakes.
Identifiers: *Thiessen polygon procedure, Hourly values, Accumulated value.

Daily precipitation values were derived for the United States portion of the Lake Ontario land basin for 1972 and 1973. The daily precipitation values were generated using a Thiessen polygon procedure and National Weather Service station data. Isohyetal maps are provided for 1972 and 1973. (NOAA)
W75-07831

2C. Snow, Ice, and Frost

ENVIRONMENTAL STUDIES OF AN ARCTIC ESTUARINE SYSTEM--FINAL REPORT,
Alaska Univ., College. Marine Science Inst.
For primary bibliographic entry see Field 2L.
W75-07417

POTENTIAL VALUE OF EARTH SATELLITE MEASUREMENTS TO OCEANOGRAPHIC RESEARCH IN THE SOUTHERN OCEAN,
National Environmental Satellite Service Washington, D.C.
E. P. McClain.
NOAA Technical Memorandum NESS 61, January 1975. 18 p, 6 fig, 1 tab, 35 ref, append. NOAA-75021904.

Descriptors: *Oceanographic surveys, *Mapping, *Temperature gradients, *Geodesy, Maps, Microwaves, Equipment, Communication, *Antarctic.
Identifiers: Ice pack concentrations, Satellite observations, Sea-ice, Sea surface temperature, Southern Ocean.

Data from NOAA operational satellites as well as from NASA research and development satellites such as Nimbus and the Earth Resources Technology Satellite (ERTS) have increasing operational and research use in oceanography. Methods are being developed to improve the mapping and monitoring of icepack concentration, character, and condition from satellite observations in the visible, near-infrared, and thermal infrared parts of the spectrum. Techniques also have been developed to map sea-surface temperatures and temperature gradients on regional and hemispheric scales from space. Recently acquired NOAA and ERTS measurements are higher in spectral and spatial resolution than those previously available, and the newest Nimbus carries the first passive microwave imager in space. Examples of some of this newly available data and their applications are presented, future sensor systems are discussed briefly. (NOAA)
W75-07421

SNOW DEPTH AND SNOW EXTENT USING VHRR DATA FROM THE NOAA-2 SATELLITE,
National Environmental Satellite Service, Washington, D.C.
D. F. McGinnis, Jr., J. A. Pritchard, and D. R. Wiesnet.
Available from the National Technical Information Service, Springfield, Va. 22161 NOAA Technical Memorandum NESS 63, February 1975. 10 p, 7 fig, 5 ref. (NOAA-75032701).

Descriptors: Satellites(Artificial), *Snow, Data collections, *Remote sensing, Meteorology, Density, Reflectance, *Regression analysis, Southeast U.S.
Identifiers: *NOAA-2 Environmental Satellite, *Spectral bands, Parabolic regression analysis, *Very high resolution, Radiometer(VHRR), Densitometer, Thermal spectral bands, Visible spectral bands, *Snow depths.

The NOAA-2 environmental satellite provides daily coverage of the Earth in the visible (0.6-0.7 micrometers) and thermal (10.5-12.5 micrometers) spectral bands. The ground resolution of the Very High Resolution Radiometer (VHRR) is 1 km at nadir. This improved resolution in the visible region permits more detailed observation of snow features than was possible with previous operational satellites. A densitometer examination of a visible-band image from Feb. 11, 1973, which shows heavy snow cover in considerable detail over areas extending from Alabama to North Carolina, indicates that, in general, there is direct correlation between increasing brightness and increasing snow depths. Digitized reflectance data from the study area were compared with prestorm

bare-ground digitized reflectance data of Feb. 6, 1973, to determine the relation of snow reflectivity to snow depths. A parabolic regression analysis of greatest satellite brightness versus greatest snow depth for 211 data pairs produced a correlation coefficient of 0.84. (NOAA)
W75-07423

SEASONAL CHANGE OF ANTARCTIC SEA ICE COVER,
Lamont-Doherty Geological Observatory, Palisades, N.Y.
A. L. Gordon, and H. W. Taylor.
Science, Vol 187, No 4174, p 346-347, January 31, 1975. 2 fig, 14 ref.

Descriptors: *Sea ice, *Ice cover, *Ice, *Antarctic, Antarctic Ocean, Winds, *Seasonal, Heat balance.

The winter expansion of the sea ice surrounding Antarctica and the subsequent retreat of the ice in summer may be linked with the wind stress acting on the Southern Ocean in conjunction with the heat exchange in open water regions within the ice fields. Calculations suggested a probability that the curl of the wind stress and the associated Ekman divergence, in conjunction with the heat balance, may account for the immense expansion of the Antarctic sea ice in winter. The rapid decay of the ice in summer would also be related to these factors, when the generation of open water acts as a heat source for the ocean. (Sims-ISWS)
W75-07431

LANDFORM-SOIL-VEGETATION-WATER CHEMISTRY RELATIONSHIPS, WRIGLEY AREA, N.W.T.: I. MORPHOLOGY, CLASSIFICATION, AND SITE DESCRIPTION,
British Columbia Univ., Vancouver. Dept. of Soil Science.
For primary bibliographic entry see Field 2K.
W75-07435

COASTAL BREAKUP IN THE ALASKAN ARCTIC,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
A. D. Short, and W. J. Wiseman, Jr.
Geological Society of America Bulletin, Vol 86, No 2, p 199-202, February 1975. 6 fig, 19 ref. ONR Contract N00014-69-A-0211-0005.

Descriptors: *Ice breakup, *Coasts, *Rivers, *Arctic, Sedimentation, Marine geology, On-site investigations, Melting, Deltas, Seashores, Snow, Ice, Beaches, Geomorphology, Beach erosion, Deposition(Sediments), *Alaska.
Identifiers: *Alaskan Arctic Coast.

During observations of breakup along the Alaskan Arctic Coast, river flooding of the frozen nearshore zone, sea ice breakup, and beach thaw were examined. Spring river flooding, generated by earlier inland melt, accompanies arrival of temperatures above O C on the coast. The extent of flooding over the nearshore ice is related to total flood discharge and coastal morphology. Along wave-controlled barrier-island coasts, flooding and bed load are confined to lagoons, whereas on fluvial-dominated coasts, floodwater and sediment spread across lobate delta fronts and offshore shoals. During this time, marine influence is minimal as a result of protection afforded by sea ice cover. Sea ice melt continues through summer, and the final coastal sea ice breakup and ice dispersion depend on offshore Ekman transport, breakup of the offshore pack ice, and local bathymetry. The coastal ice breaks up 4 to 8 weeks after initiation of melt. Melt of ice and snow within the beach generates beach collapse and resultant unique arctic beach features, whereas flow of tundra snowmelt across the beach produces microfans and micro-deltas. (Sims-ISWS)
W75-07445

ICE FALLOUT IN CONVECTIVE STORMS,
Commonwealth Scientific and Industrial Research Organization, Aspendale (Australia). Div. of Atmospheric Physics.
F. A. Berson.
Australian Meteorological Magazine, Vol 22, No 1, p 1-17, March 1974. 6 fig, 4 tab, 25 ref.

Descriptors: *Clouds, *Ice, *Convection, *Storms, *Australia, Radar, Mass, Cyclones, Satellites(Artificial), Thunderstorms, Graupel, Hail, Dew point, Reflectance, Refractivity, Hydrologic budget, Crystals.
Identifiers: Cumulonimbus, Rayleigh scattering, Echoes, Trajectories, Backscatter, Crystal concentration.

Layer-type 10 cm radar echoes from apparently 'clear air,' extending to large distances ahead of conventive storm clouds were examined for their origin and spatial dimensions. The echoes were attributed to Rayleigh scattering from ice crystals originating in the tops of cumulonimbus and anvil clouds. The quantity of ice in the echo volume was assessed from the measured reflectivity factor with the use of mass-reflectivity relationships deduced from size and concentration of crystals sampled by others in clear air and nonraining clouds. The calculated amount of one to two million tons of ice contained in the average echo volume associated with moderate to severe storms compares favorably with an estimate from considerations of water substance continuity, obtained by applying the convective precipitation model of Kessler. The crystal concentrations in the layer have not yet been established by in situ sampling in the vicinity of storms, but there is indirect evidence for particles in the diameter range 100 to 500 microns to be sufficiently concentrated to play a part in natural seeding of middle level clouds. (Jones-ISWS)
W75-07456

REPORT ON THE CANADIAN ERTS PROGRAM,
Canada Centre for Remote Sensing, Ottawa (Ontario).
For primary bibliographic entry see Field 7C.
W75-07485

ENVIRONMENTAL SURVEYS IN ALASKA BASED UPON ERTS DATA,
Alaska Univ., College.
For primary bibliographic entry see Field 7B.
W75-07486

WATER RESOURCES,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
For primary bibliographic entry see Field 7B.
W75-07494

USE OF TIME-LAPSE PHOTOGRAPHY TO ASSESS POTENTIAL INTERCEPTION IN ARIZONA PONDEROSA PINE,
Arizona Univ., Tucson. Dept. of Watershed Management.
L. C. Tennyson, P. F. Ffolliott, and D. B. Thorud.
Water Resources Bulletin, Vol 10, No 6, p 1246-1254, December, 1974. 3 fig, 16 ref.

Descriptors: Snow, *Snowmelt, *Snow management, *Ponderosa pine trees, *Water yield improvment, Snowcover, Snowpacks, Canopy, Evaporation, Sublimation, *Interception, Streamflow, Wind erosion.
Identifiers: *Time lapse photography.

The behavior of intercepted snow on a stand of uneven-aged ponderosa pine was studied using a super 8 mm time-lapse movie camera to determine the significance of snowfall interception to water yield from this type of forest. A snow load index was developed to estimate interception storage for 2 trees in the field of view for discrete time periods. The rate of snow accumulation was nonlinear with initial storage being rapid, then slowing with time. Most of the intercepted snow eventually reached the snowpack on the ground by snowmelt, snowslide, or wind. Some water was lost by evaporation of meltwater or sublimation of canopy snow, but these losses appeared to be minor. The knowledge of intercepted snow behavior in these areas is prerequisite to formation of water yield improvement programs involved with snow resources. (Mastic-Arizona)
W75-07547

NASA REMOTE SENSING OF SEA ICE IN AIDJEX,
Geological Survey, Tacoma, Wash.
W. J. Campbell.
In: Means of Acquisition and Communication of Ocean Data, Vol 2, Surface, Sub-surface and Upper-air Observations; Proc of WMO Technical Conference, Tokyo, Oct 2-7, 1972: World Meteorological Organization Report No 7, p 56-66, 1973. 13 ref.

Descriptors: *Remote sensing, *Sea ice, *Arctic, Data collections, Ice cover, Heat flow, Aircraft, Satellites(Artificial).
Identifiers: *AIDJEX.

AIDJEX (Arctic Ice Dynamics Joint Experiment) is an international and interdisciplinary study of the sea ice of the Arctic Ocean. The objective of AIDJEX is to reach a fundamental understanding of the dynamics and thermodynamic interaction between the sea ice and its environment. The AIDJEX Committee and Principal Investigators view remote sensing as a necessary and integral part of any investigation of sea ice, and great efforts are being made to utilize all available aircraft and satellite support. (Knapp-USGS)
W75-07564

EXTENDED AERATION SEWAGE TREATMENT IN COLD CLIMATES,
Environmental Protection Agency, College, Alaska. Arctic Environmental Research Lab.
For primary bibliographic entry see Field 5D.
W75-07608

HYDROLOGICAL AND EROSION INFLUENCES OF SHELTERBELTS, (IN RUSSIAN),
For primary bibliographic entry see Field 4D.
W75-07651

2D. Evaporation and Transpiration

A CALCULATION OF SUMMARY EVAPORATION OF AN OBSERVATION OF AN IRRIGATION REGIME OF SALINE SOILS,
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gidrotekhniki i Melioratsii, Moscow (USSR).
S. I. Vanichkina, and E. K. Karimov.
Dokl Vses Ord Lenina Akad S-Kh Nauk Im V I Lenina. 5. p 44-45. 1973.

Descriptors: *Saline soils, *Irrigation practices, *Evaporation, *Cotton, Corn(Field), Soil-water-plant relationships, Heat balance, Moisture availability, Soil water, Moisture uptake.
Identifiers: Summary evaporation.

Methods of calculation of summary evaporation from cotton fields using biological curves of water usage and evaporation from cotton, summary radiation and deficit of air moisture were used. The results were compared with materials of heat-balancing observations of the evaporation during a course of a year. The results of calculations of summary evaporation of corn fields from the biological curves of this culture, from the dependance of summary evaporation on the active

water reserves of the soil and from the relationship of average daily output of water to the vegetation with the yield of green mass of the corn are also included.--Copyright 1974, Biological Abstracts, Inc.
W75-07415

DROUGHT IN THE SAHARA: A BIOGEOPHYSICAL FEEDBACK MECHANISM,
Massachusetts Inst. of Tech., Cambridge. Dept. of Meteorology.
For primary bibliographic entry see Field 2B.
W75-07430

STABLE ISOTOPE FRACTIONATION DUE TO EVAPORATION AND ISOTOPIC EXCHANGE OF FALLING WATERDROPS: APPLICATIONS TO ATMOSPHERIC PROCESSES AND EVAPORATION OF LAKES,
Pennsylvania Univ., Philadelphia. Dept. of Geology.
M. K. Stewart.
Journal of Geophysical Research, Vol 80, No 9, p 1133-1146, March 20, 1975. 13 fig, 7 tab, 31 ref. NSF Grant GA-33860.

Descriptors: *Isotope fractionation, *Isotope studies, *Evaporation, Atmosphere, Vapor pressure, Humidity, Equilibrium, Condensation, Kinetics, Humidity, Deuterium, Ventilation, Drops(Fluids), Lakes.
Identifiers: *Isotope exchange, Kinetic fractionation.

Drops of water were allowed to evaporate or exchange water with surrounding air while being freely suspended on vertical streams of N2, Ar, or He gas and confined in a uniformly tapered glass tube with relative humidities of 0, 50, and 100%. The purpose was to determine the effects of evaporation and isotopic exchange on the deuterium and oxygen-18 contents of the drops. Equilibrium fractionation was found to exist between a drop and vapor at its surface even during rapid evaporation in zero humidity atmospheres. A kinetic fractionation occurred during diffusive transport of the vapor species (H2O, HDO, and H2O18) between the surface of the drop and the free atmosphere. In dry atmospheres the kinetic fractionation was given by D/D prime to the nth power, where D/D prime is the ratio of the diffusion coefficients of H2O and HDO or H2O16 and H2O18 in the particular gas used. The exponent n was found to be in good agreement with the value obtained from studies of evaporation rates of falling drops by previous authors (n = 0.58). In moist atmospheres the kinetic fractionation depended also on the relative humidity and isotope composition of the atmospheric vapor. Exchange adjustment times for isotopic equilibration of drops with saturated atmospheres were measured and found to be in agreement with theoretical predictions. Applications of the results to the study of atmospheric processes and isotopic fractionation during evaporation of lakes were discussed. (Roberts-ISWS)
W75-07473

ESTIMATING EVAPOTRANSPIRATION BY HOMOCLIMATES,
Geological Survey, Lubbock, Tex.
T. E. A. Van Hylckama.
Geographical Review, Vol 65, No 1, p 37-48, January 1975. 4 fig, 1 tab, 31 ref.

Descriptors: *Evapotranspiration, *Southwest U.S., *Arid lands, *Climatology, Meteorology.
Identifiers: *Homoclimates.

Climates are often characterized by graphs in which temperature and precipitation or evapotranspiration and precipitation are combined. Stations having similar climatic diagrams are called homoclimes. An example of the applicability of the method of using homoclimates to estimate potential evapotranspiration is taken from the semiarid southwestern United States. Two comparisons are made: one between evapotranspiration rates measured in evapotranspirometers near Buckeye, Arizona, and those computed with microclimatological data available from a homoclimatic area about 50 kilometers to the east, near Tempe, Arizona; the other between rates computed with data from both places. (Knapp-USGS)
W75-07576

HEAT EXCHANGE BETWEEN OCEAN AND ATMOSPHERE IN THE EASTERN NORTH PACIFIC FOR 1961-71,
National Marine Fisheries Service, La Jolla, Calif. Southwest Fisheries Center.
N. E. Clark, L. Eber, R. M. Laurs, J. A. Renner, and J. F. T. Saur.
Available from Superintendent of Documents, U.S. Govt. Printing Office, Washington, DC 20402, as C55.13: NMFS SSRF-682. Technical Report NMFS SSRF-682, December 1974. 108 p.

Descriptors: *Oceanography, *Heat flux, Climate changes, Heat transfer, *Pacific Ocean.
Identifiers: *Heat exchange, *Ocean's thermal structure, *Air-sea interaction, Total heat exchange values, Sensible heat transfer, Incoming solar radiation, Effective back radiation, Fisheries prediction, Heat exchange computations.

Summaries of large-scale heat exchange between ocean and atmosphere in the eastern North Pacific Ocean are presented for the period 1961 through 1971. The summaries are based on computations made from synoptic marine radio weather reports and include (1) monthly values of total heat exchange and departures from a long-term mean; (2) long-term monthly mean values of the total heat exchange, incoming solar radiation, effective back radiation, and evaporative and sensible heat transfer and (3) annual cycles of total heat exchange for selected areas. Outstanding spatial and temporal features of the heat exchange values are discussed. Comparisons are made between the total heat exchange values and those given in two other reports. Discrepancies between values given in this report and those published in the other reports are attributed to differences in the empirical equations used to make the heat exchange computations, differences in data processing techniques, differences in the observed data used in the computations due to different methods of acquisition, and the possibility of ocean climate changes. (NOAA)
W75-07714

2E. Streamflow and Runoff

A GLOBAL OCEAN-ATMOSPHERE CLIMATE MODEL. PART II. THE OCEANIC CIRCULATION,
National Oceanic and Atmospheric Administration, Princeton, N.J. Geophysical Fluid Dynamics Lab.
For primary bibliographic entry see Field 2A.
W75-07447

FLOODS IN AND NEAR THE CHARLOTTE AMALIE AREA, ST. THOMAS, U.S. VIRGIN ISLANDS,
Geological Survey of Puerto Rico, San Juan.
For primary bibliographic entry see Field 7C.
W75-07550

TIME-OF-TRAVEL STUDY, LAKE ERIE-NIAGARA RIVER BASINS,
Geological Survey, Albany, N.Y.
For primary bibliographic entry see Field 5B.
W75-07554

EFFECT OF PORT ORANGE BRIDGE-CAUSEWAY ON FLOW OF HALIFAX RIVER, VOLUSIA COUNTY, FLORIDA,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 4C.
W75-07555

COMPUTING BACKWATER AT OPEN CHANNEL CONSTRICTIONS,
Geological Survey, Bay Saint Louis, Miss. Gulf Coast Hydroscience Center.
For primary bibliographic entry see Field 8B.
W75-07558

HYDROLOGIC DATA OF THE HOOSIC RIVER BASIN, MASSACHUSETTS,
Geological Survey, Boston, Mass.
B. P. Hansen, F. B. Gay, and L. G. Toler.
Massachusetts Water Resources Commission, Boston, Hydrologic-Data Report No 15 (U S Geological Survey open-file report), 1974. 33 p, 1 fig, 14 tab, 18 ref.

Descriptors: *Basic data collections, *Surface waters, *Groundwater, *Massachusetts, Hydrologic data, Streamflow, Water quality, Water wells, Springs, Sediment load.
Identifiers: *Hoosic River basin(Mass).

The Hoosic River has its headwaters in northwestern Massachusetts and southern Vermont and flows northwestward through southern Vermont into New York, where it is tributary to the Hudson River. This report contains hydrologic data for that part inside Massachusetts and includes all, or parts of, the towns of Adams, Cheshire, Clarksburg, Dalton, Florida, Hancock, Lanesborough, New Ashford, North Adams, Savoy, Williamstown, and Windsor. Data presented include selected information on wells, test borings, springs, seismic surveys, streamflow records, chemical analyses of surface water and groundwater and of rainfall, and suspended-sediment concentrations of surface water. (Knapp-USGS)
W75-07565

HYDROLOGIC RECORDS FOR LAKE COUNTY, FLORIDA, 1972-73,
Geological Survey, Tallahassee, Fla.
C. P. Laughlin, and D. M. Hughes.
Open-file report FL-74018, 1974. 77 p, 38 fig, 25 tab, 7 ref.

Descriptors: *Basic data collections, *Hydrologic data, *Florida, Groundwater, Surface waters, Lakes, Streamflow, Water levels, Water wells, Water quality.
Identifiers: *Lake County(Fla).

This report contains selected basic data on the water resources of Lake County, Florida and summarized hydrologic conditions during 1972-73. Records of water levels in wells and lakes, and chemical and bacteriological analyses are reported for May 1972 to May 1973. Stream discharge records are reported for October 1, 1971 to September 30, 1972, the 1972 water year. (Knapp-USGS)
W75-07566

EXTENT AND FREQUENCY OF FLOODS ON SCHUYLKILL RIVER NEAR PHOENIXVILLE AND POTTSTOWN, PENNSYLVANIA,
Geological Survey, Harrisburg, Pa.
For primary bibliographic entry see Field 4A.
W75-07567

WATER RESOURCES OF THE CURLEW VALLEY DRAINAGE BASIN, UTAH AND IDAHO,
Geological Survey, Salt Lake City, Utah.
For primary bibliographic entry see Field 4A.
W75-07570

DYE-DISPERSION STUDY ON LAKE CHAMPLAIN, NEAR CROWN POINT, NEW YORK,
Geological Survey, Albany, N.Y.
For primary bibliographic entry see Field 5B.
W75-07571

VELOCITY AND DEPTH MEASUREMENTS FOR USE IN THE DETERMINATION OF REAERATION COEFFICIENTS,
Geological Survey, Trenton, N.J.
J. S. Zogorski, P. W. Anderson, and O. O. Williams.
Open-file report, 1973. 31 p, 6 fig, 3 tab, 29 ref.

Descriptors: *Reaeration, *Streamflow, Velocity, Depth, Discharge(Water), Water quality.
Identifiers: *Reaeration coefficients.

Empirical computation of reaeration coefficients generally requires knowledge of mean velocity and mean depth of a stream. A practical method for obtaining this knowledge is described. The method involves time-of-travel, streamflow, and cross-sectional measurements, the development of discharge-velocity curves, streamflow profiles, and the computation of cross-sectional areas. Values for mean velocity and mean depth are determined and related to mean discharge. (Knapp-USGS)
W75-07572

MAGNITUDE AND FREQUENCY OF FLOODS IN KANSAS--UNREGULATED STREAMS,
Geological Survey, Lawrence, Kans.
For primary bibliographic entry see Field 4A.
W75-07581

EFFECTS OF THE MAY 5-6, 1973, STORM IN THE GREATER DENVER AREA, COLORADO,
Geological Survey, Reston, Va.
W. R. Hansen.
Circular 689, 1973. 20 p, 19 fig, 9 ref.

Descriptors: *Floods, *Colorado, *Rainfall-runoff relationships, *Storm runoff, Urban hydrology, Erosion, Sedimentation, Flood damage, Urban runoff.
Identifiers: *Denver(Colo).

The Greater Denver area, Colorado, has had a long history of intensive rainstorms and infrequent but destructive floods. Rain began falling on the Greater Denver area the evening of Saturday, May 5, 1973, and continued through most of Sunday, May 6. Below about 7,000 feet altitude, the precipitation was mostly rain; above that altitude, it was mostly snow. Although the rate of fall was moderate, at least 4 inches of rain or as much as 4 feet of snow accumulated in some places. Sustained precipitation falling at a moderate rate thoroughly saturated the ground and by midday Sunday sent most of the smaller streams into flood stage. The South Platte River and its major tributaries began to flood by late Sunday evening and early Monday morning. Damage was generally most intense in areas where man had modified the landscape--by channel constrictions, paving, stripping of vegetation and topsoil, and oversteepening of hillslopes. Roads, bridges, culverts, dams, canals, and the like were damaged or destroyed by erosion and sedimentation. Streambanks and structures along them were scoured. Thousands of acres of croplands, pasture, and developed urban lands were coated with mud and sand. Flooding was intensified by inadequate storm sewers, blocked drains, and obstructed drainage courses. Saturation of hillslopes along the Front Range caused rockfalls, landslides, and mudflows as far west as Berthoud Pass. (Knapp-USGS)
W75-07582

WATER-RESOURCES INVESTIGATIONS IN TEXAS, FISCAL YEAR 1975.
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 7C.
W75-07583

RIVER FORECASTS PROVIDED BY THE NATIONAL WEATHER SERVICE, VOLUME 1, 1972.
National Weather Service, Office of Hydrology. Silver Spring, Md.
For primary bibliographic entry see Field 4A.
W75-07717

THE INITIAL WATER CIRCULATION AND WAVES INDUCED BY AN AIRFLOW,
National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Lab.
W. L. McLeish, and G. E. Putland.
Available from Superintendent of Documents, U.S. Govt Printing Office, Washington DC 20402. Report ERL 316-AOML 16, February 1975. 45 p, 21 fig, 1 tab, 8 ref.

Descriptors: *Air flow, Laminar flow.
Identifiers: *Wind-generated water current, *Water circulation, *Water waves, *Wind-water tunnel, Circulation pattern, Capillary-gravity waves, Capillary waves, Gravity waves, Wave energy, Ocean surface, Air-sea interactions, Mechanisms of transport, Water-velocity profiles.

The early water circulation and waves under an airflow were examined in laboratory experiments. At a particular fetch or time, a waterflow undergoes a laminar-turbulent transition through an intermediate circulation pattern. Simultaneously the first, capillary-gravity waves undergo a correlated characteristic transition leading to separate capillary and gravity waves, and the wave energy increases markedly. Some of the energy of the current is transferred to the waves during the transition. A viscous sublayer lies at the surface above a turbulent flow, but is thinner than a corresponding sublayer at a solid boundary. (NOAA)
W75-07718

THREE DIMENSIONAL TURBULENT DIFFUSION FROM POINT SOURCES OF POLLUTION IN AN OPEN CHANNEL,
Delaware Univ., Newark. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 5B.
W75-07723

HYDROLOGICAL AND PHYSICAL-CHEMICAL INVESTIGATIONS ON THE PO RIVER AT POLESELLA: 2. JULY 1970-JUNE 1973, (IN ITALIAN),
Istituto di Biologia del Mare, Venice (Italy).
For primary bibliographic entry see Field 5B.
W75-07741

HYDROLOGICAL AND PHYSICAL-CHEMICAL INVESTIGATIONS ON THE ADIGE RIVER AT BOARA PISANI: 2. JULY 1970-JUNE 1972, (IN ITALIAN),
Istituto di Biologia del Mare, Venice (Italy).
For primary bibliographic entry see Field 5B.
W75-07742

WATER CURRENT OR TIDE DIRECTION-OF-FLOW INDICATOR,
For primary bibliographic entry see Field 7B.
W75-07823

THE WINDS, CURRENTS AND WAVES AT THE SITE OF THE FLOATING CITY OFF WAIKIKI,
Hawaii Univ., Honolulu. Dept. of Ocean Engineering.
For primary bibliographic entry see Field 4A.
W75-07826

DIGITAL RADAR DATA AND ITS APPLICATION IN FLASH FLOOD FORECASTING,
National Weather Service Forecast Office, Pittsburgh, Pa.
For primary bibliographic entry see Field 4A.
W75-07832

CLIMATOLOGY OF LAKE ERIE STORM SURGES AT BUFFALO AND TOLEDO,
National Weather Service, Silver Spring, Md. Techniques Development Lab.
For primary bibliographic entry see Field 2H.
W75-07834

MAP SHOWING DRAINAGE AREAS, HADDAM QUADRANGLE, CONNECTICUT,
Geological Survey, Hartford, Conn.
For primary bibliographic entry see Field 7C.
W75-07839

MAP SHOWING DRAINAGE AREAS, GUILFORD QUADRANGLE, CONNECTICUT,
Geological Survey, Hartford, Conn.
For primary bibliographic entry see Field 7C.
W75-07840

MAP SHOWING DRAINAGE AREAS, BRANFORD QUADRANGLE, CONNECTICUT,
Geological Survey, Hartford, Conn.
For primary bibliographic entry see Field 7C.
W75-07841

MAP SHOWING DRAINAGE AREAS, NEW HAVEN-WOODMONT QUADRANGLES, CONNECTICUT,
Geological Survey, Hartford, Conn.
For primary bibliographic entry see Field 7C.
W75-07842

MAP SHOWING DRAINAGE AREAS, NIANTIC QUADRANGLE, CONNECTICUT,
Geological Survey, Hartford, Conn.
For primary bibliographic entry see Field 7C.
W75-07843

MAP SHOWING DRAINAGE AREAS, OLD LYME QUADRANGLE, CONNECTICUT,
Geological Survey, Hartford, Conn.
For primary bibliographic entry see Field 7C.
W75-07844

WATER AVAILABILITY AND GEOLOGY OF WALKER COUNTY, ALABAMA,
Geological Survey, Tuscaloosa, Ala.
For primary bibliographic entry see Field 7C.
W75-07846

2F. Groundwater

FLOW PATTERNS OF RAINWATER THROUGH SLOPING SOIL SURFACE LAYERS AND THE MOVEMENT OF NUTRIENTS BY RUNOFF,
Iowa State Univ., Ames. Dept. of Agronomy.
For primary bibliographic entry see Field 5B.
W75-07395

HYDROLOGY AND GEOCHEMISTRY OF KARST TERRAIN, UPPER LOST RIVER DRAINAGE BASIN, INDIANA,
Indiana Univ., Bloomington. Dept. of Geology.
J. L. Bassett.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-241 714, $5.25 in paper copy, $2.25 in microfiche. MA Thesis, June 1974. 102 p, 30 fig, 6 tab, 40 ref, 4 append. OWRT C-3122(No. 3689)(1).

Descriptors: *Hydrology, *Geochemistry, *Karst hydrology, *Indiana, Areal hydrogeology, Hydrogeology, Streamflow, Watersheds(Basins), Chemistry, Geology, Water chemistry, Carbonate rocks, Karst, Groundwater, Limestones, Sinks, Subsurface drainage.
Identifiers: *Lost River(Ind).

The upper Lost River drainage basin of south-central Indiana has long been regarded as one of the classic karst areas of the United States. Several large sinking streams and two large karst springs are known in the basin. Stream tracing with fluorescent dye proved the existence of two major independent karst drainage systems. The karst springs respond very rapidly to rainfall, and quantitative dye tracing showed that flow velocities as great as 5.5 miles per day exist in subsurface drainage conduits. Waters sampled from the Orangeville Rise have a dominate CaCO3 composition at moderate to high flow rates, but at low flow rates contain appreciable Mg and SO4. The Ca/Mg molar ratios are inversely related to SO4 concentration. Waters entering swallow holes along the eastern margin of the sinkhole plain are consistently supersaturated with respect to calcite and have equilibrium CO2 pressures about an order of magnitude lower than those at the Orangeville Rise. Two principal forms of spring flow recharge occur in the basin: (1) direct and rapid recharge from open swallow holes and (2) diffuse infiltration from the sinkhole plain. (Sims-ISWS)
W75-07398

SURFACE PLUGGING DURING BASIN RECHARGE OF TURBID WATER,
Southwestern Great Plains Research Center, Bushland, Tex.
For primary bibliographic entry see Field 4B.
W75-07439

EARTH RESISTIVITY SURVEYS - A METHOD FOR DEFINING GROUND-WATER CONTAMINATION,
Geraghty and Miller, Port Washington, N.Y.
For primary bibliographic entry see Field 5B.
W75-07440

WATER LEVEL FLUCTUATIONS DUE TO EARTH TIDES IN A WELL PUMPING FROM SLIGHTLY FRACTURED CRYSTALLINE ROCK,
Du Pont de Nemours (E.I.) and Co., Aiken, S.C. Savannah River Lab.
For primary bibliographic entry see Field 5B.
W75-07463

ANALYSIS OF FLOW TO AN EXTENDED FULLY PENETRATING WELL,
Pahlavi Univ., Shiraz (Iran).
For primary bibliographic entry see Field 4B.
W75-07464

NEW EQUATIONS FOR DETERMINING THE FORMATION CONSTANTS OF AN AQUIFER FROM PUMPING TEST DATA,
Sheffield Univ. (England). Dept. of Civil and Structural Engineering.
For primary bibliographic entry see Field 4B.
W75-07465

NUMERICAL ANALYSIS OF VERTICAL WATER MOVEMENT IN A BOUNDED PROFILE,
New South Wales Univ., Kensington (Australia). School of Civil Engineering.
For primary bibliographic entry see Field 2G.
W75-07521

GEOHYDROLOGY OF BACA AND SOUTHERN PROWERS COUNTIES, SOUTHEASTERN COLORADO,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 7C.
W75-07551

COASTAL SALINITY RECONNAISSANCE AND MONITORING SYSTEM--SOUTH COAST OF PUERTO RICO,
Geological Survey of Puerto Rico, San Juan.
For primary bibliographic entry see Field 5A.
W75-07553

VIBRATORY COMPACTION IN THE LABORATORY OF GRANULAR MATERIALS IN LONG COLUMNS,
Geological Survey, Reston, Va.
A. I. Johnson, and D. A. Morris.
Reprint of Paper from American Society for Testing Materials Special Technical Publication 523, p 171-181, 1973. 6 fig, 1 tab, 10 ref.

Descriptors: *Porous media, *Laboratory tests, *Compaction, Density, Packed beds, Flow, Specific yield, Groundwater movement, *Drainage.
Identifiers: *Vibratory compaction.

For a laboratory study of the drainage of long columns of porous media, a maximum density, uniformly distributed throughout the column, was required. A mechanical technique was developed for the packing of drainage columns, as much as 60 inches long, with glass beads and natural sands of various particle sizes. A vibratory packer used to pack these columns (1 to 8 inches in diameter) provided good reproducibility of dry unit weight and porosity between duplicate columns as well as a vertical uniformity of these properties within the same or duplicate columns. The standard method of packing columns is based on the effects of time, amplitude, and surcharge weight on the uniformity and reproducibility of results. The technique was standardized at a packing period of 10 seconds and a vibratory amplitude of 0.09 cm. (Knapp-USGS)
W75-07559

GEOHYDROLOGIC CONSIDERATIONS IN THE MANAGEMENT OF RADIOACTIVE WASTE,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 5B.
W75-07562

HYDROLOGIC DATA OF THE HOOSIC RIVER BASIN, MASSACHUSETTS,
Geological Survey, Boston, Mass.
For primary bibliographic entry see Field 2E.
W75-07565

FIELD TRIP GUIDE BOOK FOR HYDROGEOLOGY OF THE TWIN CITIES ARTESIAN BASIN,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 4B.
W75-07573

TECTONIC STRESS DETERMINATIONS, NORTHERN PICEANCE CREEK BASIN, COLORADO,
Geological Survey, Reston, Va.
R. G. Wolff, J. D. Bredehoeft, W. S. Keys, and F. Shuter.
In: Energy Resources of the Piceance Creek basin, Colorado: Guidebook, 25th Field Conference, Rocky Mountain Association of Geologists, Denver, p 193-197, 1974. 6 fig, 1 tab, 15 ref.

Descriptors: *Groundwater basins, *Colorado, *Stress, *Geophysics, Borehole geophysics, Fractures(Geologic).
Identifiers: *Tectonic stress, *Hydraulic fracturing, *Piceance Creek basin(Colo).

A study of the groundwater hydrology of the northern portion of the Piceance Creek basin provided the opportunity to determine the regional state of tectonic stress of the area. Uncased holes were logged with a borehole televiewer to select fracture-free zones. Specially designed equipment permitted the hydraulic fracturing of all preselected zones during one trip into the hole. Fracturing pressures and instantaneous shut-in pressures were used to determine the magnitude of the principal horizontal stresses. Post-fracturing televiewer logging revealed the dip and strike of induced fractures. Comparision of the orientation and magnitude of stresses, as determined from the fracturing and televiewer logging data, agrees well with surface indications of the tectonic state of stress. The approach can be used to obtain meaningful state of stress measurements. (Knapp-USGS)
W75-07574

SIMULATED WATER-LEVEL CHANGES RESULTING FROM PROPOSED CHANGES IN GROUND-WATER PUMPING IN THE HOUSTON, TEXAS, AREA,
Geological Survey, Houston, Tex.
For primary bibliographic entry see Field 7C.
W75-07575

WATER-RESOURCES INVESTIGATIONS IN TEXAS, FISCAL YEAR 1975.
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 7C.
W75-07583

A SPECIAL PLANNING TECHNIQUE FOR STREAM-AQUIFER SYSTEMS,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 2A.
W75-07584

STOCHASTIC MODELING OF GROUND-WATER SYSTEMS,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
L. W. Gelhar, P. K. Ko, H. H. Kwai, and J. L. Wilson.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-241 740, $9.25 paper copy, $2.25 microfiche. Ralph M. Parsons Laboratory for Water Resources and Hydrodynamics, Report No 189, September 1974. 313 p, 121 fig, 12 tab, 48 ref, 4 append. $5.00. OWRT C-4119(No 9022)(2).

Descriptors: *Groundwater, *Aquifer testing, *Stochastic processes, Surface-groundwater relationships, Aquifers, Mathematical models, Groundwater recharge, *Kansas, Model studies, Estimating, Time series analysis, Analytical techniques.
Identifiers: *Spectral analysis, Aquifer parameters estimation.

Important new research results are developed on the use of spectral analysis techniques to evaluate groundwater resources. The linear theory of aquifer spectral response in the frequency domain is developed, including effects of aquifer slope, vertical flow, and variable transmissivity. Numerical simulations of the nonlinear effects in the spectral domain are developed and show that the nonlinear effects are typically quite small, thus making the simple linear theory applicable for most field situations. Additional features explored are the effects of spatial variability of hydraulic conductivity and the influence of transient flow in the partially saturated zone above the water table. Through spectral analysis in the wave number domain, an error criterion is established for a simple observation network which is used to measure

groundwater flow. The effects of storage in the partially saturated zone on the frequency spectrum of groundwater fluctuations are estimated and found to be negligible in most cases. The theoretical results are applied to evaluate, through spectral analysis, time series of groundwater levels, precipitation and stream stage for a site in Kansas. Using a procedure based on the linear spectral theory, estimates of aquifer transmissivity and storativity are developed. The procedure yields parameter estimates which are in agreement with those obtained from pumping tests. The results should be applicable under specified conditions to the estimation of aquifer parameters from natural fluctuations of groundwater level.
W75-07595

SYSTEM IDENTIFICATION AND MULTI-LEVEL OPTIMIZATION OF INTEGRATED GROUND WATER SYSTEMS,
California Univ., Los Angeles. Dept. of Engineering Systems.
J. A. Dracup.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-241 924, $3.25 paper copy, $2.25 microfiche. Completion Report, February 1974. 3 p, 3 ref. OWRT A-033-CAL(4).

Descriptors: *Optimization, *Conjunctive use, *Surface-ground water relationships, Mathematical models, *Model studies, Forecasting, *Aquifer characteristics, *Optimum development plans, *Groundwater.
Identifiers: System identification, Multi-level optimization.

Conjunctive surface water and ground water systems are analyzed using the techniques of system identification and multi-level optimization. Mathematical models describing the behavior of the ground water regime are developed. Given historic ground water levels and aquifer parameters, transfer functions of the model are determined. Given any input, future responses of the system are predicted. Aquifer characteristics are determined for each subsystem in the first-level optimization. A general model for optimal development and operation of an integrated ground water basin is developed in the second-level optimization.
W75-07722

COOPERATIVE PHENOMENA IN ISOTOPIC HYDRODYNAMIC DISPERSION,
Nevada Univ., Reno. Desert Research Inst.
For primary bibliographic entry see Field 5B.
W75-07725

HYDROGEOLOGICAL MAPS OF THE ALLUVIAL AQUIFER IN AND ADJACENT TO THE ROCKY MOUNTAIN ARSENAL, COLORADO,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 7C.
W75-07836

AVAILABILITY OF GROUND WATER IN THE SACO RIVER BASIN, EAST-CENTRAL NEW HAMPSHIRE,
Geological Survey, Concord, N.H.
For primary bibliographic entry see Field 7C.
W75-07837

MAPS OF SAN GORGONIO PASS-UPPER COACHELLA VALLEY AREA, CALIFORNIA, SHOWING WATER-LEVEL CONTOURS, 1936 AND 1966-17,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 7C.
W75-07838

GEOLOGIC MAP OF WALKER COUNTY, ALABAMA,
Geological Survey, Tuscaloosa, Ala.
For primary bibliographic entry see Field 7C.
W75-07845

WATER AVAILABILITY AND GEOLOGY OF WALKER COUNTY, ALABAMA,
Geological Survey, Tuscaloosa, Ala.
For primary bibliographic entry see Field 7C.
W75-07846

2G. Water In Soils

EFFECT OF SOIL ENRICHMENT WITH MINERAL ELEMENTS AND FERTILIZERS ON SURFACE WATER AND PLANTS,
Ghent Rijksuniversiteit (Belgium). Faculteit Landbouwwetenschappen.
For primary bibliographic entry see Field 5B.
W75-07368

EFFECTS OF SURFACE MOISTURE SUPPLY ON THE SUBSOIL NUTRITIONAL REQUIREMENTS OF LUCERNE (MEDICAGO SATIVA L.),
Commonwealth Scientific and Industrial Research Organization, Canberra (Australia). Div. of Plant Industry.
J. R. Simpson, and J. Lipsett.
Australian Journal of Agricultural Research, Vol 24, No 2, p 199-209, March 1973. 6 tab, 1 fig, 22 ref.

Descriptors: *Moisture availability, *Subsoil, *Drought tolerance, *Nutrient requirements, *Crop production, *Soil profiles, Phosphorus, Lime, Root distribution, Fertilizers.
Identifiers: Monocalcium phosphate, Sodium borate, Fertilizer placement, *Lucerne(Medicago sativa L.).

Lucerne plants (Medicago sativa L.) were grown in deep (85 cm.) reconstituted profiles of granitic soils under glasshouse conditions. The plants were subjected to controlled degrees of drought in surface layers, while a water table was maintained at 85 cm. depth. The effect of monocalcium phosphate, sodium borate, and calcium carbonate (lime) at a 55 cm. depth was compared with an application to the surface layers, either frequently moistened or dry. Deep placement of monocalcium phosphate increased the phosphorus content and yield of the droughted plants, but the effects were greatly enhanced when the phosphate band was amended with lime and borate. This combination of phosphate, lime and borate was particularly effective because of a marked increase in lateral root proliferation within the amended layer. The results show the importance of subsoil nutritional characteristics in stabilizing lucerne yields over intermittently wet and dry periods. (Mastic-Arizona)
W75-07393

STRUCTURAL PROBLEMS OF INDONESIAN SOILS,
Lembaga Penelitian Tanah, Bogor (Indonesia).
D. Muljadi.
Meded Fac Landbouwwet Rijksuniv Gent. Vol 37, No 3, p 1062-1065, 1972.

Descriptors: Soils, *Soil stabilization, Polymers, *Construction, Erosion control, Moisture intake, Water loss, Sands, Clays.
Identifiers: Andosols, *Indonesia, Volcanic sand.

Suitable soil conditioners or polymers must be found for the improvement of the soil physical conditions of specific problem soils such as: volcanic sand, especially to improve: soil structure, aggregate stability, water holding capacity, and nutrient holding capacity; eroded soils of high clay content (montmorillonite and illite), to improve: aggregate stability, water intake rate, and to reduce erosion and surface runoff; andosol, to improve soil structure and stability of aggregates and to reduce erosion and surface runoff.--Copyright 1974, Biological Abstracts, Inc.
W75-07394

FLOW PATTERNS OF RAINWATER THROUGH SLOPING SOIL SURFACE LAYERS AND THE MOVEMENT OF NUTRIENTS BY RUNOFF,
Iowa State Univ., Ames. Dept. of Agronomy.
For primary bibliographic entry see Field 5B.
W75-07395

SOIL MOISTURE TRANSPORT IN ARID SITE VADOSE ZONES,
Atlantic Richfield Hanford Company, Richland, Wash. Research Dept.
For primary bibliographic entry see Field 5B.
W75-07403

MULTIPLE REGRESSION EQUATIONS ESTIMATING WATER HOLDING CAPACITIES WITH TEXTURAL COMPOSITION AND ORGANIC MATTER OF UPLAND SOILS IN KOREA (IN KOREAN),
Institute of Plant Environment, Suwon (Republic of Korea).
D. Y. Cha, and M. E. Park.
Res Rep Off Rural Dev (Plant Environ) (Suwon). 15. p 29-36, 1973. English summary.

Descriptors: Moisture tension, *Field capacity, *Estimating, Wilting point, *Retention, *Estimating equations, Mathematical studies, *Regression analysis, *Soils, Silt, Water availability, Soil surfaces, Subsoil.
Identifiers: *Korea, Upland soils.

Formulas to estimate the water holding capacity of Korean upland soil are proposed as follows: field moisture capacity % = 7.0922 + (0.2474 x silt %) + (0.3069 x clay %) + (1.1236 x O.M. (organic matter) %); wilting point moisture % = 2.6687 + (0.0319 x silt %) + (0.3109 x clay %) + (0.4175 O.M. %); available moisture % = 4.5406 + (0.2121 x silt %) - (0.0014 x clay %) + (0.716 O.M. %). The water holding capacity has a positive correlation with silt, clay, and organic matter and a negative correlation with the sand fraction. Silt content greatly influences field moisture capacity and clay also has some effect on wilting point moisture. Surface soils are slightly higher than subsoils in available moisture. With an increase of 1% organic matter, field moisture capacity increases in 0.46-1.74%, wilting point moisture. 0.08-0.73%, available moisture, 0.02-0.26%.--Copyright 1974, Biological Abstracts, Inc.
W75-07406

A CALCULATION OF SUMMARY EVAPORATION OF AN OBSERVATION OF AN IRRIGATION REGIME OF SALINE SOILS,
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gidrotekhniki i Melioratsii, Moscow (USSR).
For primary bibliographic entry see Field 2D.
W75-07415

SOIL WATER HYSTERESIS IN A FIELD SOIL,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
K. K. Watson, R. J. Reginato, and R. D. Jackson.
Soil Science Society of America Proceedings, Vol 39, No 2, p 242-246, March-April 1975. 5 fig, 11 ref.

Descriptors: *Soil water, *Hysteresis, On-site investigations, *Soil moisture, *Soil physical properties, Soil, Soil tests, Soil investigations, Moisture, Moisture content, Moisture availability, Soil moisture meters, Instrumentation, Soil density, Water pressure, Tensiometers, Bulk density.

Identifiers: *Unsaturated soils, *Undisturbed soil cores.

The requirements for the measurement in the field of the hysteresis characteristics of the soil water pressure (h)-water content (theta) relationship were discussed and details given of the method whereby an undisturbed hexagonal monolith of soil was isolated from the surrounding soil. The instrumentation used in measuring the soil water movement in this monolith, with particular reference to h and theta measurements at points in the soil profile, was described. The shapes of typical theta-time and h-time curves were discussed in relation to possible hysteresis, and the actual h(theta) relationship for soil at the 8- to 9-cm depth was determined. (Prickett-ISWS)
W75-07428

MICROCOMBUSTION METHOD FOR THE DETERMINATION OF CARBON-14-LABELED PESTICIDE RESIDUES IN SOIL,
Agricultural Research Service, Fort Collins, Colo.
For primary bibliographic entry see Field 5A.
W75-07432

LANDFORM-SOIL-VEGETATION-WATER CHEMISTRY RELATIONSHIPS, WRIGLEY AREA, N.W.T.: I. MORPHOLOGY, CLASSIFICATION, AND SITE DESCRIPTION,
British Columbia Univ., Vancouver. Dept. of Soil Science.
For primary bibliographic entry see Field 2K.
W75-07435

EFFECT OF STONES ON THE HYDRAULIC CONDUCTIVITY OF RELATIVELY DRY DESERT SOILS,
California Univ., Riverside. Dept. of Soil Science and Agricultural Engineering.
G. R. Mehuys, L. H. Stolzy, J. Letey, and L. V. Weeks.
Soil Science Society of America Proceedings, Vol 39, No 1, p 37-42, January-February 1975. 8 fig, 4 tab, 13 ref. NSF Subcontract No. 539.

Descriptors: *Soil water, *Soil water movement, *Bulk density, *Hydraulic conductivity, Laboratory tests, Tensiometers, Volumetric analysis, Gravimetric analysis, Deserts, Soils.
Identifiers: *Stony soils, *Soil columns, Matric potential, Thermocouple psychrometers.

The objective was to determine whether moisture transmission properties of stony soils could be evaluated using samples of the same soil in which the stony fraction (greater than 2 mm) had been excluded. Experiments were conducted in the laboratory on soil columns with and without stones. Unsaturated hydraulic conductivity was measured with a transient outflow method over the matric potential range of -0.05 to -50 bars by using tensiometers and soil psychrometers. On a weight basis, the soils studied contained up to 40% stones greater than 2 mm in diameter. If expressed as a function of matric potential, hydraulic conductivity values were similar, with or without stones. Soil water potential as measured by tensiometers or by thermocouple psychrometers was not affected by stones because these instruments respond to moisture changes in the soil portion only. When unsaturated hydraulic conductivity was expressed as a function of volumetric water content, the apparent conductivities were higher for a given water content when stones were present. A simple correction of water contents of stone-free samples, based on the stone volume of each soil, adequately accounted for differences observed when water contents were computed on a total volume basis. (Schicht-ISWS)
W75-07436

SOIL ERODIBILITY AS DETERMINED BY RAINDROP TECHNIQUE,
International Inst. of Tropical Agriculture, Ibadan (Nigeria).
For primary bibliographic entry see Field 2J.
W75-07448

FIELD DETERMINATION OF HYSTERESIS IN SOIL-WATER CHARACTERISTICS,
Universite Scientifique et Medicale de Grenoble (France). Institut de Mecanique.
J. M. Royer, and G. Vachaud.
Soil Science Society of America Proceedings, Vol 39, No 2, p 221-223, March-April 1975. 3 fig, 12 ref.

Descriptors: *Soil water, *Hysteresis, On-site investigations, *Soil moisture, *Soil physical properties, Soils, Soil tests, Soil investigations, Moisture, Moisture content, Moisture availability, Soil moisture meters, Instrumentation, Soil density, Water pressure.
Identifiers: *Soil water suction, *Unsaturated soils.

It is still a common practice to infer field values of soil water content (or of soil water suction) from the measurement of the soil water suction (or the soil water content) and the use of 'representative' soil water characteristics. A series of independent measurements of changes in water content and in soil suction were conducted on two watersheds during one year. It was shown on both sites that hysteresis is too important to be neglected, and that considerable errors will result from the determination of both water content and soil suction with the use of a single sensor. (Prickett-ISWS)
W75-07451

DRYING OF LAYERED SOIL COLUMNS UNDER NONISOTHERMAL CONDITIONS,
Volcani Inst. of Agricultural Research, Bet-Dagan (Israel).
A. Hadas.
Soil Science, Vol 119, No 2, p 143-148, February 1975. 6 fig, 1 tab, 16 ref.

Descriptors: *Soils, *Evaporation, *Soil water, *Laboratory tests, *Diffusivity, Soil profiles, Soil properties, Heat flow, Heterogeneity, Cultivation, Flow.
Identifiers: *Soil columns, Aggregate size classes, Vapor transfer, Nonisothermal conditions.

An experiment was carried out to clarify the effects of steady and fluctuating nonisothermal conditions on evaporation from soil profiles having an aggregated top layer of different thicknesses and aggregate sizes. It was found that there are optimal ranges of aggregate size and depth of the top layer which result in reduced evaporation losses from layered soils. These results differ from theoretical predictions and the discrepancies were discussed and explained. Under fluctuating nonisothermal conditions the water losses were reduced to a larger extent than under steady nonisothermal conditions. These results showed that employing an isothermal diffusion model to nonisothermal evaporation will introduce large errors into the predictions. Furthermore, any evaporation experiment carried out to check or evaluate the process under field conditions, should be carried out under simulated field conditions. It was suggested that to conserve water in the soil profile by tillage operations, the soil should be tilled prior to the introduction of the water into the soil. (Schicht-ISWS)
W75-07452

USE OF AXISYMMETRIC INFILTRATION MODEL AND FIELD DATA TO DETERMINE HYDRAULIC PROPERTIES OF SOILS,
Utah State Univ., Logan. Dept. of Civil Engineering.
R. W. Jeppson, W. J. Rawls, W. R. Hamon, and D. L. Schreiber.
Water Resources Research, Vol 11, No 1, p 127-138, February 1975. 13 fig, 3 tab, 26 ref.

Descriptors: *Soil water movement, *Infiltration, *Soil moisture meters, *Infiltrometers, *Hydraulic conductivity, Simulated rainfall, Field capacity, Pore pressure, Hydrologic properties, Saturated flow, Permeability, *Idaho.
Identifiers: *Reynolds Creek Experimental Watershed(Idaho), Burdine equation.

A numerical model was described for solving axisymmetric infiltration problems. The model uses saturation-capillary pressure data and a modified Burdine equation to develop reasonable estimates of relative hydraulic conductivity. A specially designed infiltrometer and a field data collection system, which provide infiltration capacity, saturation-time, and saturation-capillary pressure data, were also described. The numerical solutions were fitted to the field data to define the hydraulic properties of the soil. Close agreement was found between the numerical model solutions and the field measurements for two sites on the Reynolds Creek Experimental Watershed in southwestern Idaho. A feasible method was developed for determining the hydraulic properties of surface soils under natural conditions. (Gibb-ISWS)
W75-07466

THEORY OF WATER MOVEMENT IN SOILS: 11. CONCLUSION AND DISCUSSION OF SOME RECENT DEVELOPMENTS,
Connecticut Agricultural Experiment Station, New Haven. Dept. of Ecology and Climatology.
J-Y. Parlange.
Soil Science, Vol 119, No 2, p 158-161, February 1975. 1 tab, 15 ref.

Descriptors: *Soils, *Analytical techniques, *Absorption, *Diffusion, *Diffusivity, Moisture content, *Soil water movement, Soil water.

Recent research has extended some of the analytical tools developed in the present series of papers on the theory of water movement in soils. Various corrections were discussed and compared in the case of one-dimensional diffusion. It was shown that the suggestion by Cisler to correct earlier results by simply multiplying by a constant numerical factor was a significant improvement, particularly when the diffusivity does not vary too rapidly with water content. (See also W73-12600, W73-05099, W73-08341, W73-05098, W73-05097, W73-04225, W73-04106, and W72-02728) (Schicht-ISWS)
W75-07482

SEASONAL TRENDS AND VARIABILITY OF SOIL MOISTURE UNDER TEMPERATE PASTURE ON THE NORTHERN TABLELANDS OF NEW SOUTH WALES (AUSTRALIA),
University of New England, Armidale (Australia). Dept. of Agronomy and Soil Science.
R. C. G. Smith, and G. G. Johns.
Australian Journal of Experimental Agriculture and Animal Husbandry, Vol 15, No 73, p 250 - 255, April 1975. 6 fig, 16 ref.

Descriptors: *Water balance, *Model studies, *Moisture availability, *Soil moisture, *Seasonal, *Pastures, Soil-water-plant relationships, Dry seasons, Pasture management, Planting management, Meteorological data, Evaporation, Rainfall, Australia.
Identifiers: Northern Tablelands(N.S.W.).

A water balance model predicting changes in soil moisture at Armidale, New South Wales (Australia) was developed and tested against soil moisture measurements over a two-year period. The model accounted for 96% of the variance in observed soil moisture. It was then used to predict the expected soil moisture pattern using long-term records for daily rainfall and pan evaporation. The predicted seasonal patterns are described, and

their consequences for the establishment of new pasture species and forage crops are discussed. The need for soil moisture data in interpreting the results of field experiments is stressed. (CSIRO)
W75-07520

NUMERICAL ANALYSIS OF VERTICAL WATER MOVEMENT IN A BOUNDED PROFILE,
New South Wales Univ., Kensington (Australia). School of Civil Engineering.
K. K. Watson, and A. A. Curtis.
Australian Journal of Soil Research, Vol 13, No 4, p 1 - 11, April 1975. 10 fig, 13 ref.

Descriptors: *Soil water movement, *Numerical analysis, *Infiltration, *Air, Mathematical studies, Porous media, Drainage, Computer models, Soil profiles, Sands, Unsaturated flow, Darcys law, Equations.

The usual assumption made in soil water studies that the effect of the air phase on the flow process is negligible is discussed in relation to certain profile configurations where such an assumption is not valid. A computer-based numerical solution of the equation describing water movement in an unsaturated soil is then modified by the inclusion of a time-dependent boundary condition, thus allowing the modelling of the air compression effect during infiltration. This analysis also satisfactorily models the drainage along primary draining scanning curves which occurs in the upper part of the profile as the air pressure increases. The analysis is limited to the Darcy flow regime which, for the system considered, terminates when the excess air pressure equals the air entry value of the porous material. Detailed results are presented for a sand and a sandy loam. (CSIRO)
W75-07521

REDISTRIBUTION OF WATER FOLLOWING PRECIPITATION ON PREVIOUSLY DRY SANDY SOILS,
Commonwealth Scientific and Industrial Research Organization, Wembley (Australia). Div. of Land Resources Management.
B. A. Carbon.
Australian Journal of Soil Research, Vol 13, No 4, p 13-19, April 1975. 4 fig, 2 tab, 8 ref.

Descriptors: *Soil water movement, *Sands, *Field capacity, Infiltration, Soil moisture, Diffusion, Moisture tension, Moisture content, Mathematical studies, Laboratory tests, Wetting, Germination, Clovers, Soil-water-plant relationships.

Theoretical and experimental evidence is provided to show that the redistribution of a given amount of water some days after infiltration into a previously dry soil can be predicted, provided that the relationship between soil water potential and soil water content is known. The capillary potential at the wetting front during infiltration into the dry soil is also required. In sandy soils an increase in amount of applied water leads to a decrease in the soil moisture content at the soil surface. This change in 'field capacity' as a function of applied water is shown to strongly influence seedling emergence. (CSIRO)
W75-07522

SIMULATION OF THE WATER BALANCE FOR PLANTS GROWING ON COARSE-TEXTURED SOILS,
Commonwealth Scientific and Industrial Research Organisation, Wembley (Australia). Div. of Land Resources Management.
For primary bibliographic entry see Field 2I.
W75-07523

AN EVALUATION OF THE USE OF WASTE HEAT FOR SOIL WARMING IN THE SOUTHEAST,
North Carolina State Univ., Raleigh. Dept. of Biological and Agricultural Engineering.
For primary bibliographic entry see Field 3C.
W75-07599

DISTRIBUTION AND PERSISTENCE OF 1,2-DIBROMO-3-CHLOROPROPANE IN SOIL AFTER APPLICATION BY INJECTION AND IN IRRIGATION WATER,
California Univ., Davis. Dept. of Nematology.
For primary bibliographic entry see Field 5B.
W75-07609

THE EFFECT OF SLAKED-LIME AND STRAW ON THE SOIL PH IN THE FLOODED AND UPLAND CONDITION (IN KOREAN),
Office of Rural Development, Suwon (Republic of Korea). Crop Experiment Station.
S. B. Ahn, M. H. Lee, and W. K. Oh.
Res Rep Off Rural Dev (Plant Environ) (Suwon). 15. p 67-71, 1973, English summary.

Descriptors: *Soils, *Alkalinity, Soil properties, Soil chemical properties, Lime, Flood plains, Flooding, *Hydrogen ion concentration, Rice.
Identifiers: *Slaked-lime, *Straw, Upland.

Rice straw was applied at 3 levels, 0, 0.3 and 0.6% of soil and slaked-lime at 0, 0.15 and 0.3%. Soil pH was affected by both straw and slaked-lime in the flooded condition, but only slaked-lime affected the soil pH in the upland condition. The following formulas were given: in the flooded condition; pH = 5.5293 + 8.6007x sub 1 + 2.7836x sub 2- 6.7422x sub 1 sup 2-1.8522x sub 2 sup 2 - 7.000x sub 1 x sub 2 and in the upland condition; pH = 5.29 + 0.613x sub 1 - 0.00912x sub 1 sup 2 (x sub 1 = slaked lime, x sup 2 = straw). When basic materials were not supplied and the concentration of CO sub 2 was high, soil pH was affected by (H) sup + ions, but when basic materials were supplied continuously and concentration of CO sub 2 was low, soil pH was affected by (OH) -ions.--Copyright 1974, Biological Abstracts, Inc.
W75-07645

DECREASE OF THE LOSS OF SOIL NUTRIENTS AND RICE HARVEST DURING EARLY PRESOWING FLOODING OF THE RICE FIELD, (IN RUSSIAN),
Akademiya Nauk Kazakhskoi SSR, Alma-Ata. Inst. of Microbiology and Virology.
A. N. Ilyaletdinov, I. Zh. arAstanov, M. K. Kanatchinova, and S. I. Suleimenova.
Izv Akad Nauk Kaz SSR Ser Biol. Vol 6, p 38-44, 1973, Illus.

Descriptors: *Nutrients, Soil microorganisms, *Organic matter, *Rice, Nitrogen.
Identifiers: Anaerobiosis, *Soil nutrients.

The readily soluble organic matter of soil passing into a weakly alkaline extract is decomposed by soil microorganisms within several weeks. In the case of aerobic decomposition of the organic matter of soil the N of readily hydrolyzed compounds (protein) is lost along with the readily soluble C compounds. The losses of gaseous ammonia from calcareous meadow-bog soils are inversely proportional to the degree of saturation of the soil with water, being minimum in flooded soil. Ammonium is lost in noticeable quantities from moderately wet soil. Early flooding, promoting an earlier onset of anaerobiosis and decrease of losses of nutrients from the soils of rice fields, increases the yield of rice.--Copyright 1974, Biological Abstracts, Inc.
W75-07731

SOILS OF THE CAUCA VALLEY WITH INVERTED CA:MG RATIOS: I. GENERAL CHARACTERISTICS OF THE SOILS,
Centro Nacional Investigaciones Agropecuaria, Palmira (Colombia).
G. Mantilla, and L. A. Leon.
Rev Inst Colomb Agropecu. Vol 61, No 1, p 41-56. 1971, Illus.

Descriptors: *Soil chemical properties, Calcium, Magnesium, Clay minerals, Cation exchange, Hydrogen-ion concentration.
Identifiers: *Colombia(Cauca Valley).

Physical, chemical and mineralogical studies were made of 5 areas in the Cauca valley (Colombia) where the Ca:Mg ratio is less than 1. All are poorly drained and prone to flooding, and some crops show symptoms like those encountered on alkaline or saline soils. The predominant clay minerals are montmortillonite, vermiculite and illite. Mg saturation ranges between 50 and 75% and Ca saturation is less than 45% of cation exchange capacity. Soils of this type where montmorillonite predominates, may require higher Ca saturation in the exchangeable complex for normal plant growth. pH and exchangeable Na do not seem to be limiting factors in productivity.--Copyright 1973, Biological Abstracts, Inc.
W75-07736

DYNAMISM OF THE WATER AND SALT CYCLE OF SOILS UNDER CLOSED DRAINAGE CYCLE CONDITIONS, (IN AZERBAIJAN),
P. Yu. Nagiev.
Izv Akad Nauk Az Ssr Ser Biol Nauk. Vol 2, p 58-63. 1972, Illus.

Descriptors: *Saline soils, Salts, Drainage, Irrigation.
Identifiers: *USSR(Eastern Shirvana).

Variations in the salt content in different soils with closed cycle drainage in Eastern Shirvana were studied. Intensely irrigated soils showed decreasing salt contents from cycle to cycle, while the salt levels in soils not used intensely for irrigation were fairly constant. An increase in the salt content of soils not used for farming was determined.--Copyright 1973, Biological Abstracts, Inc.
W75-07746

MULCHING EFFECTS BY HOLEY SHEET TO DIRECT SOWING CULTURE OF PADDY RICE ON DRAINED LOWLAND RICE FIELD: I. CHECKING EFFECTS OF MULCHING ON WATER LEAKAGE, ROOT DISTRIBUTION, GROWTH AND YIELD OF PADDY RICE PLANT, (IN JAPANESE),
Tokyo Univ. of Agriculture and Technology (Japan). Experimental Farm.
For primary bibliographic entry see Field 3F.
W75-07748

MICROBIOLOGICAL AND ENZYMIC ACTIVITY OF IRRIGATED AND FERTILIZED SOIL (IN RUSSIAN),
Khersonskii Selskokhozyaistvennyi Institut (USSR).
For primary bibliographic entry see Field 3F.
W75-07764

2H. Lakes

VERIFICATION OF NUMERICAL MODELS OF LAKE ONTARIO. II. STRATIFIED CIRCULATIONS AND TEMPERATURE CHANGES,
Canada Centre for Inland Waters, Burlington (Ontario).
T. J. Simons.
Journal of Physical Oceanography, Vol 5, No 1, p 98-110, January 1975. 10 fig, 2 tab, 15 ref.

Descriptors: *Lake Ontario, *Circulation, *Hydraulic models, *Numerical analysis, Mathematical studies, Water circulation, Temperature, Heat budget, Mixing, Currents(Water), Lakes, Great Lakes, *Model studies, Mathematical models, *Water temperature.
Identifiers: *Stratified circulations, 1972 International Field Year on Lake Ontario.

Data from the 1972 International Field Year on Lake Ontario were used to test the performance of three-dimensional hydrodynamic models of large lakes. This study is a sequel to a previous report concerning the quasi-homogeneous model simulation of an episode associated with tropical storm Agnes during the latter part of June 1972, and it is concerned with the stratified model simulation of the circulation of Lake Ontario during and after a storm on August 9, 1972. In addition, the temperature predictions and heat content changes for both episodes were discussed. With regard to time scales greater than the inertial period, the water levels and currents computed under stratified conditions agreed with observations to the same extent as under homogeneous conditions. Stratification appeared to exert an appreciable effect on the circulation, but it was difficult to separate baroclinic and barotropic effects because of their interactions. For intermediate time scales, the quality of temperature predictions appeared acceptable with reference to advective heat transports. Longer term mechanisms of thermocline formation, maintenance, and erosion were not considered in view of the proposed use of this model in conjunction with an operational monitoring program. Short-term dynamical effects with the associated phenomena of internal waves were not well simulated in the experiments because of the choice of model parameters. (See also W75-01987) (Jess-ISWS)
W75-07462

THE EFFECTS OF GEOLOGY AND LAND USE ON THE EXPORT OF PHOSPHORUS FROM WATERSHEDS,
Toronto Univ. (Ontario). Dept. of Zoology.
For primary bibliographic entry see Field 5B.
W75-07470

STABLE ISOTOPE FRACTIONATION DUE TO EVAPORATION AND ISOTOPIC EXCHANGE OF FALLING WATERDROPS: APPLICATIONS TO ATMOSPHERIC PROCESSES AND EVAPORATION OF LAKES,
Pennsylvania Univ., Philadelphia. Dept. of Geology.
For primary bibliographic entry see Field 2D.
W75-07473

WAVE-INDUCED NEARSHORE CIRCULATION,
Tetra Tech, Inc., Pasadena, Calif.
For primary bibliographic entry see Field 2L.
W75-07476

AGE DETERMINATION AND YEAR-CLASS FLUCUTATIONS OF CISCO, COREGONUS ALBULA L., IN THE MJOSA HYDROELECTRIC RESERVOIR, NORWAY,
Ministry of Agriculture, Oslo (Norway).
P. Aass.
Rep Inst Freshwater Res Drottningholm. 52p 5-22, 1972, Illus.

Descriptors: *Fish, *Aging(Biological), *Cisco, Herring, Analyses, Europe, Reservoirs.
Identifiers: Coregonus-Albula, Mjosa, Hydroelectric reservoir, *Norway.

The reliability of cisco aging techniques was tested by examining scales and otoliths from 2068 fish caught on the spawning run during the years 1966-71. Disagreements between scale and otolith ages occur at all age levels, but increase markedly beyond otolity age 3+. In nearly all cases of disagreement, otolith age is higher than scale age and the difference may be as great as 7 yr. Age compositions and length-frequency distributions together with tagging results demonstrate that cisco ages can be determined more accurately from otoliths than from scales. Otoliths show that most ciscoes mature at an age of 2+. Fish up to ages 7+–8+ are important for the commercial fishery. The oldest specimens identified were of the age 12+. The recruitment is very uneven. Only every 3rd yr does a rich year class arise. The intervening year classes are insignificant and may fail altogether to appear in the catches. The fluctuations are probably not caused by river regulations or lake impoundments, nor by climatic factors. Intraspecific food competition is probably responsible for the population fluctuations. At the present time there is no need for fishery regulations or artificial stocking of cisco in Mjosa.--Copyright 1974, Biological Abstracts, Inc.
W75-07560

WATER-QUALITY RECONNAISSANCE OF SURFACE INFLOW TO UTAH LAKE,
Geological Survey, Salt Lake City, Utah.
For primary bibliographic entry see Field 5A.
W75-07586

PHOSPHORUS CYCLING IN LAKES,
North Carolina Univ., Chapel Hill. Dept. of Environmental Sciences and Engineering.
For primary bibliographic entry see Field 5B.
W75-07597

FUTURE DREDGING QUANTITIES IN THE GREAT LAKES,
Eastern Michigan Univ., Ypsilanti. Dept. of Geography and Geology.
For primary bibliographic entry see Field 5G.
W75-07603

PHYTOPLANKTON COMPOSITION AND ABUNDANCE IN LAKE ONTARIO DURING IFYGL,
Michigan Univ., Ann Arbor. Great Lake Research Div.
For primary bibliographic entry see Field 5C.
W75-07604

EUTROPHICATION OF SURFACE WATER - LAKE TAHOE'S INDIAN CREEK RESERVOIR,
Lake Tahoe Area Council, South Lake Tahoe, Calif.
For primary bibliographic entry see Field 5C.
W75-07605

EUTROPHICATION OF LAKE TAHOE EMPHASIZING WATER QUALITY,
California Univ., Davis. Inst. of Ecology.
For primary bibliographic entry see Field 5C.
W75-07691

MATHEMATICAL MODELING OF PHYTOPLANKTON IN LAKE ONTARIO 1. MODEL DEVELOPMENT AND VERIFICATION,
Manhattan Coll., Bronx. N.Y. Environmental Engineering and Science Program.
For primary bibliographic entry see Field 5C.
W75-07700

ECOLOGICAL STUDIES ON FRY AND JUVENILE OF FISHES AT AQUATIC PLANT AREAS IN A BAY OF LAKE BIWA: III. RELATIONSHIP OF THE FOOD HABITS TO THE HABITAT OF NIGOROBUNA (CARASSIUS CARASSIUS GLANDOCULUS) LARVAE, (IN JAPANESE),
Kanazawa Univ. (Japan). Biology Inst.
K. I. Hirai.
Jap J Ecol, Vol 22, No 2, p 69-93, 1972, Illus. English summary.

Descriptors: *Fry, Fish food organisms, Fish behavior, Larvae, Ecology.
Identifiers: Carassius, Chydorus, Nigorobuna, *Japan(Lake Biwa).

The relationship of the food habits to the habitat of nigorobuna larvae was investigated at Yamanoshita Bay in the south basin of Lake Biwa (Japan) from 1964 to 1968. Quantitative analyses of feeding of larvae were studied for significance of the aquatic plant belt as a habitat of the larvae. Though the larvae are more or less distributed throughout the aquatic plant belt, they are very abundant in the submerged plant belt. The more abundant floating plant materials present, the higher is the density of the larvae. There is a fairly good quantity of plankters available for the nigorobuna larvae in the aquatic plant belt, and their amount increases in relation to that of the floating plant materials. The nigorobuna larvae devoured small crustaceans and chironomid larvae which are commonly found in the aquatic plant belts; they eat Chydorus intensively. The bulk of the gut contents of the larvae increase in relation to plankter density. The food habits of the nigorobuna larvae is discussed in relation to their habitat preference. A submerged plant belt with abundant floating plant materials where numerous small cladocerans flourish is the most favorable site for development of the nigorobuna larvae.--Copyright 1973, Biological Abstracts, Inc.
W75-07729

SEASONAL OCCURRENCE OF SEVERAL GROUPS OF HETEROTROPHIC BACTERIA IN TWO RESERVOIRS,
Caskoslovanska Adademie Ved, Prague. Hydrobiologicka Laborator.
For primary bibliographic entry see Field 5A.
W75-07732

CORRELATION BETWEEN TROPHIC STRUCTURE, SPECIES DIVERSITY AND BIOMASS OF ZOOPLANKTON OF NORTHERN LAKES, (IN RUSSIAN),
Moscow State Univ. (USSR). Faculty of Biology and Soil Science.
A. M. Gilyarov, and T. A. Gorelova.
Zool Zh. Vol 53, No 1, p 25-34, 1974, Illus, English summary.

Descriptors: *Biomass, *Zooplankton, Lakes.
Identifiers: USSR, Species diversity.

The ratio of carnivore biomass to herbivore biomass (Bc/Bh) was used as an index of trophic structure. Species diversity (H) was estimated by the Shannon formula using biomass values. A positive correlation was found between the total biomass (B) and Bc/Bh both by the average data for all lakes and for individual lakes. A negative correlation was found between B and H for individual lakes. Bc/Bh and H are negatively correlated as well. To estimate the correlation between 2 indices and not take into account the 3rd one, coefficients of partial correlation were used. There is no correlation between Bc/Bh and H, the value of B being constant. A correlation between Bc/Bh and B exists, the value of H being constant. All coefficients attain significant values only for communities in sufficiently deep water. The importance of lake depth remains as yet unclear since B and Bc/Bh correlate positively with the depth whereas no correlation is observed between B nd Bc/Bh, the depth being constant.--Copyright 1974, Biological Abstracts, Inc.
W75-07734

FOOD OF WHITE CATFISH, ICTALURUS CATUS (LINN.) (ICTALURIDAE) STOCKED IN FARM PONDS,
University of Agricultural Sciences, Bangalore (India). Dept. of Fish Culture.

K. V. Devaraj.
Int Rev Gesamten Hydrobiol. Vol 59, No 1, p 147-151. 1974.

Descriptors: *Catfishes, *Fish food organisms, *Alabama.

Stomach contents of 124 white catfish, I. catus, ranging from 51-431 mm collected from farm ponds of Auburn University, Auburn, Alabama were examined. Fishes in these ponds were given supplemental food 6 days/wk. Juvenile catfish below 100 mm fed more actively on a variety of food items than larger fish. White catfish measuring 201 mm and above preferred dipterans to other natural food items. In all size groups supplemental feed occupied a dominant position when compared to other food items. Other food items present in the stomachs in varying quantities included detritus, microcrustaceans, trichipterans, fish remains and miscellaneous items, thus indicating the omnivorous feeding of white catfish.--Copyright 1974, Biological Abstracts, Inc.
W75-07737

ENERGY BALANCE AND EXCHANGE IN A LAKE: EXAMPLE OF A MATHEMATICAL ANALYSIS OF LIMNOLOGICAL PROCESSES, (IN GERMAN),
Max-Planck-Institut fuer Limnologie zu Ploen (West Germany).
H. J. Krambeck.
Arch Hydrobiol. Vol 73, No 2, p 137-192. 1974, Illus. English summary.

Descriptors: *Lakes, *Water temperature, *Energy budget, Limnology, *Mathematical models.

Long term measurements of water temperature at short intervals at several depths of a lake is a powerful tool in solving some limnological problems. They make possible the investigation of the frequency and amplitudes of internal seiches and the evaluation of the exchange constant which is responsible for the transport of dissolved matter in the lake. These studies in connection with measurements of solar radiation and air temperature make possible the construction of a thermal model which describes the physical energy balance of a lake.--Copyright 1974, Biological Abstracts, Inc.
W75-07738

DYNAMICS AND PRODUCTIVITY OF PHYTOPLANKTON AND PELAGIC BACTERIA IN A HIGH MOUNTAIN LAKE (ANTERIOR FINSTERTAL LAKE, AUSTRIA), (IN GERMAN),
Innsbruck Univ. (Austria). Inst. of Zoology.
For primary bibliographic entry see Field 5C.
W75-07745

ROLE OF CRUCIAN CARP IN TRANSMISSION OF ENTERIC PATHOGENS, (IN KOREAN),
Catholic Medical Coll., Seoul (Republic of Korea). Dept. of Preventive Medicine.
For primary bibliographic entry see Field 5B.
W75-07747

LIMNOLOGICAL TRANSPORT AND FOODSTUFF MODELS (IN GERMAN,
For primary bibliographic entry see Field 5C.
W75-07751

MITES ASSOCIATED WITH AQUATIC AND SEMI-AQUATIC DIPTERA FROM SAN MATEO COUNTY, CALIFORNIA (ACARINA: HYGROBATIDAE, UNIONICOLIDAE, PIONIDAE, ASCIDAE AND DIPTERA: CHIRONOMIDAE, TIPULIDAE, PSYCHODIDAE),
San Mateo County Mosquito Abement District, Burlingame, Calif.
R. H. Whitsel, and R. F. Schoeppner.
Proc Entomol Soc Wash. Vol 75, No 1, p 71-77, 1973.

Descriptors: *Diptera, *Mites, Reservoirs, Aquatic insects, *California.
Identifiers: Acarina, Ascidae, Chironomidae, Hygrobatidae, Phaenopsectra-profusa, Pionidae, Psychodidae, Tipulidae, Unionicolidae.

Light trap collections near a reservoir in San Mateo County, California, included many aquatic and semi-aquatic Diptera (Chironomidae, Tipulidae, Psychodidae) with attached mites (Acarina: Hygrobatidae, Unionicolidae, Pionidae, Ascidae). Insects and associated mites, their abundance and some observations on their biology are listed. Weekly tabulation of mite incidence on Phaenopsectra profusa (Townes) is presented--Copyright 1973, Biological Abstracts, Inc.
W75-07755

LAKE ONTARIO BASIN: OVERLAND PRECIPITATION, 1972-73,
National Oceanic and Atmospheric Administration, Ann Arbor, Mich. Great Lakes Environmental Lab.
For primary bibliographic entry see Field 2B.
W75-07831

CLIMATOLOGY OF LAKE ERIE STORM SURGES AT BUFFALO AND TOLEDO,
National Weather Service, Silver Spring, Md. Techniques Development Lab.
N. A. Pore, H. P. Perrotti, and W. S. Richardson.
NOAA Technical Memorandum NWS TDL-54, March 1975. 27 p, 18 fig, 4 tab, 2 ref.

Descriptors: *Storm surge, *Lake Erie, *Storms, Storm water, Damages, Surface waters, Water measurement, Water levels, *New York, Ohio.
Identifiers: *Water surface, *Lake level, *Extratropical storms, Buffalo(NY), Toledo(Ohio).

Extratropical storms frequently cause the water surface of Lake Erie to become distorted with high water in one end of the lake and low water in the other. The abnormal water levels are called storm surges and are defined to be the effect of meteorological disturbance on the lake level. Storm surges can be either positive or negative. The climatological monthly frequencies of storm surges of various heights at the eastern and western ends of Lake Erie are presented. Thirty-three years of lake level data for Buffalo, N.Y. and Toledo, Ohio have been processed. The occurrences of storm surges greater than two feet, both positive and negative, have been put into classes at half-foot intervals for each month of the year. This information should be useful in determining the probabilities of specific storm surge heights and lake levels in the future. (NOAA)
W75-07834

PEARL RIVER BOATWAY, ROSS BARNETT RESERVOIR TO JACKSON AREA,
Geological Survey, Jackson, Miss.
For primary bibliographic entry see Field 7C.
W75-07847

PEARL RIVER BOATWAY MAP, MORGANTOWN TO SANDY HOOK, COLUMBIA AREA, MISSISSIPPI,
Geological Survey, Jackson, Miss.
For primary bibliographic entry see Field 7C.
W75-07848

PEARL RIVER BOATWAY MAP, MONTICELLO TO MORGANTOWN, MISSISSIPPI,
Geological Survey, Jackson, Miss.
For primary bibliographic entry see Field 7C.
W75-07849

PEARL RIVER BOATWAY MAP, GEORGETOWN TO MONTICELLO, MISSISSIPPI,
Geological Survey, Jackson, Miss.
For primary bibliographic entry see Field 7C.
W75-07850

2I. Water In Plants

LITTORAL DISTRIBUTION AND DRIFT OF SELECTED RIFFLE INSECTS,
Idaho Cooperative Fishery Unit, Moscow.
For primary bibliographic entry see Field 8I.
W75-07356

COMPETITIVE INTERACTION OF GRASSES WITH CONTRASTING TEMPERATURE RESPONSES AND WATER STRESS TOLERANCES,
University of New England, Armidale (Australia). Dept. of Agronomy.
For primary bibliographic entry see Field 3F.
W75-07363

SALT TOLERANCE IN THE WILD RELATIVES OF THE CULTIVATED TOMATO: WATER BALANCE AND ABSCISIC ACID IN LYCOPERSICON ESCULENTUM AND L. PERUVIANUM UNDER LOW AND HIGH SALINITY,
Negev Inst. for Arid Zone Research, Beersheba (Israel). Div. of Life Sciences.
For primary bibliographic entry see Field 3C.
W75-07364

PRODUCTIVITY OF VEGETABLE CROPS IN A REGION OF HIGH SOLAR INPUT, I. GROWTH AND DEVELOPMENT OF THE POTATO (SOLANUM TUBEROSUM L.), II. YIELDS AND EFFICIENCIES OF WATER USE AND ENERGY,
Commonwealth Scientific and Industrial Research Organization, Griffith (Australia). Div. of Irrigation Research.
For primary bibliographic entry see Field 3F.
W75-07366

THE BUFFALO GOURD (CUCURBITA FOETIDISSIMA) HBK: A POTENTIAL CROP FOR THE PRODUCTION OF PROTEIN, OIL, AND STARCH ON ARID LANDS,
Arizona Univ., Tucson.
W. P. Bemis, L. C. Curtis, C. W. Weber, J. W. Berry, and J. M. Nelson.
Agriculture Technology for Developing Countries, Technical Series Bulletin No. 15, Office of Agriculture, Technical Assistance Bureau, Agency for International Development, Washington, D.C. January 1975. 20 p, 9 tab, 28 ref.

Descriptors: *Arid lands, *Vegetable crops, *Drought tolerance, *Nutrients, *Proteins, *Water requirements, North America, Plant growth, Plant breeding, Irrigation effects.
Identifiers: *Buffalo gourd, Cucurbita foetidissima.

The world wide food shortage is exacerbated in arid lands because crop production is uncertain because rainfall is uncertain. The feral xerophytic Buffalo gourd, Cucurbita foetidissima, has evolved in the semiarid regions of western North America and is well adapted to desert environments. The plant has abundant yields of seeds rich in edible oil and protein and large carbohydrate reserves in the form of starch in the large storage roots. This wild perennial has the potential of becoming a major food crop in arid regions. Its low water needs constitute an important asset. The Buffalo gourd's history, morphology, genetical and botanical characteristics are reviewed. (Bowden-Arizona)
W75-07371

ALKALOID CONTENT OF ROEMERIA REFRACTA (IN RUSSIAN),
Akademiya Nauk Uzbekskoi SSR, Tashkent. Institut Botaniki.
S. A. Salikhov, and U. A. Akhmedov.
Uzb Biol Zh. Vol 17, No 3, p 34-36, 1973.

Descriptors: *Plant morphology, Semiarid climates, *Desert plants.
Identifiers: *Alkaloid content(Plants), *Romeria-refracta, USSR, Semideserts.

Plants grown under semidesert conditions contain a greater quantity of alkaloids than plants from irrigated areas. Their maximum content was found in plants growing in lower foothills at a height of 600-800 m above sea level and the minimum at a height of 1100-1200 m. A clear-cut relation between accumulation of alkaloids and slope exposure was not established, but apparently southwestern slopes are the most favorable.--Copyright 1974, Biological Abstracts, Inc.
W75-07454

UTILITY OF ERTS FOR MONITORING THE BREEDING HABIT OF MIGRATORY WATERFOWL,
Environmental Research Inst. of Michigan, Ann Arbor.
For primary bibliographic entry see Field 7B.
W75-07492

REDISTRIBUTION OF WATER FOLLOWING PRECIPITATION ON PREVIOUSLY DRY SANDY SOILS,
Commonwealth Scientific and Industrial Research Organization, Wembley (Australia). Div. of Land Resources Management.
For primary bibliographic entry see Field 2G.
W75-07522

SIMULATION OF THE WATER BALANCE FOR PLANTS GROWING ON COARSE-TEXTURED SOILS,
Commonwealth Scientific and Industrial Research Organisation, Wembley (Australia). Div. of Land Resources Management.
B. A. Carbon, and K. A. Galbraith.
Australian Journal of Soil Research, Vol 13, No 4, p 21-31, April 1975. 4 fig, 4 tab, 15 ref.

Descriptors: *Computer models, *Water balance, *Soil-water-plant relationships, Computer programs, Simulation analysis, Interception, Infiltration, Soil water movement, Evaporation, Meteorological data, Drainage, Water storage, Throughfall, Sands, Simulation analysis.

A computer simulation model for the water balance of plants growing on a coarse soil is described, in which the flux of water between atmosphere, plant and soil compartments is determined by a rate-limiting process. The inputs required by the program are measurable physical parameters, and wherever possible calculations are performed according to established physical principles; no mathematical optimisation procedures are used. Subroutines are included for interception (optional); throughfall (added directly to the first soil compartment); redistribution between soil compartments; and evaporation. As most field meteorological data are not available on a better than daily basis, simulation is performed on a daily time scale. From tests showing close agreement between simulated and observed results, it is suggested that evaporation, soil water storage and deep drainage may be satisfactorily predicted. (CSIRO)
W75-07523

THE COMPARED BIOLOGY OF CERCOSPORIOSIS AND HELMINTHOSPORIOSIS IN GUINEA GRASS (PANICUM MAXIMUM), (IN FRENCH),
Centre de Recherches Agronomiques des Antilles et de la Guyane, Petit Bourg (Guadeloupe).
P. Pauvert, and G. Jacqua.
Ann Phytopathol. Vol 4, No 3, p 245-256. 1972, Illus, (English summary).

Descriptors: *Plant diseases, *Parasitism, Humidity, Environmental effects, Rain, Wind, *Grasses.
Identifiers: Cercospora-Fusimaculans, Cercosporiosis, Helminthosporiosis, Helminthosporium-Spp, Panicum-Maximum.

Two diseases of P. maximum are described: helminthosporiosis caused by several undetermined Helminthosporium spp. and cercosporiosis caused by Cercospora fusimaculans Atk. A comparative study of their epidemiology was done. The 2 parasites can sporulate on dead leaves where they live saprophytically. Sporulation does not occur without high humidity. Both are wind and rain dispersed, but wind dispersal is not effective for C. fusimaculans because of the poor preservation of spores at the low humidity which prevails for dissemination. Helminthosporium spores are highly resistant to desiccation and can travel far without alteration of their viability. Spash dissemination is effective for C. fusimaculans. Rainfalls over 2 mm exhaust Helminthosporium fructification, and washing of contaminated leaves occurs. Free water is necessary for spore germination of Cercospora, not for Helminthosporium. Symptoms of Helminthosporiosis may appear 12 hr after pollution, 7 days for C. fusimaculans. Under the climate of the West Indies helminthosporiosis is a more important disease than cercosporiosis.--Copyright 1974, Biological Abstracts, Inc.
W75-07552

FLUCTUATIONS OF AQUATIC AND TERRESTRIAL INVERTEBRATES IN DRIFT SAMPLES FROM CONVICT CREEK, CALIFORNIA,
Missouri Univ., Columbia. School of Forestry.
T. M. Hinckley, and H. D. Kennedy.
Northwest Sci. Vol 46, No 4, p 270-276. 1972, Illus.

Descriptors: *California, *Insects, *Aquatic insects, *Mayflies, Diurnal, Ponds.
Identifiers: Chironomids, Terrestrial insects, Crane flies, *Diurnal drift patterns, Riffles, Convict Creek(Calif).

The experimental stream sections at the Sierra Nevada Aquatic Research Laboratory, Bishop, California, were used for a study of the diurnal drift patterns of aquatic and terrestial insects in both patterns of aquatic and terrestrial insects in both a riffle and a pool. Observations were made of changes of drift abundance and type by artificially altering the water flow and velocity through these areas. A peak in aquatic drift organisms occurred around sunset. Mayflies were the dominant aquatic organisms while chironomids and crane flies were the most common terrestrial ones.--Copyright 1974, Biological Abstracts, Inc.
W75-07563

THREE TYPES OF REMOTE-READING DENDROGRAPHS,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 7B.
W75-07577

THE EFFECT OF MOISTURE DEFICIT ON CARBOHYDRATE METABOLISM OF DESERT PLANTS,
Akademiya Nauk Uzbekskoi SSR, Tashkent. Institut Botaniki.
I. L. Zakhar'Yants, N. P. Oshanina, and B. S. Sabirov.
Uzb Biol Zh, Vol 16, No 6, p 32-35. 1972.

Descriptors: *Soil moisture, Plant physiology, Carbohydrates, Arid climates, Arid lands, *Desert plants, Metabolism.
Identifiers: Artemisia-diffusa, Haloxylon-aphyllum, Haloxylon-persicum, Kochia-prostrata, Pectin, Salsoia-orientalis, Sucrose.

Under the influence of low soil moisture (20% of the full soil moisture) an increase in the carbohydrate retention was noted in the leaves of 6 taxa studied: Kochia prostrata var. villosissima Bong. et May., K. prostrata var. virescens Fenzl, Salsola orientalis S. G. Gmel., Haloxylon aphyllum (Minkw.), H. persicum Bge. and Artemisia diffusa H. Krasch. A higher carbohydrate retention was caused by an accumulation of components as sucrose, hemicellulose and pectin.--Copyright 1974, Biological Abstracts, Inc.
W75-07602

TAXONOMY AND ECOLOGY OF STENONEMA MAYFILES (HEPTAGENIIDAE:EPHEMEROPTERA),
National Environmental Research Center, Cincinnati, Ohio.
For primary bibliographic entry see Field 5C.
W75-07694

REPRODUCTION AND DEVELOPMENT OF THE BAIKAL WHITEFISH COREGONUS LAVARETUS BAICALENSIS DYB. IN CONNECTION WITH THE PROBLEM OF ITS ARTIFICIAL BREEDING, (IN RUSSIAN),
For primary bibliographic entry see Field 8I.
W75-07711

PLANT-WATER-USE EFFICIENCY WITH GROWTH REGULATORS AND TRANSPIRATION SUPPRESSANTS,
Delaware Univ., Newark. Dept. of Plant Science.
For primary bibliographic entry see Field 3C.
W75-07724

MEASUREMENT AND CONTROL OF WATER POTENTIAL IN A SOIL-PLANT SYSTEM,
New Hampshire Univ., Durham. Inst. of Natural and Environmental Resources.
G. W. Gee, W. Liu, H. Olvang, and B. E. Janes.
Soil Sci, Vol 115, No 5, p 336-342. 1973.

Descriptors: *Soil water, Soil moisture, *Root zone, Soil-water-plant relationships.
Identifiers: Polyethylene glycol, *Pepper plant.

Water potential gradients were measured in soil-grown pepper plants. In one test where plants were equilibrated at low water potentials, the root zone water potential agreed well with water potential measurements in the plant stem and plant leaves. On the other hand it was found that the water potential in root-free soil adjecent to the root zone was higher than that in the root zone and that the observed gradient increased with decreasing root zone water potential. This increased gradient was attributed to decreased soil water conductivity in the root-free soil and to increased flow resistance across a millipore membrane separating the root-free soil and the root zone. In another test the total water potential in the root zone was controlled at 3 different levels by adding polyethylene glycol solution directly to the root zone. In this test the water potentials and water potential gradients responded in a reasonable fashion to the applied osmotic stress indication that control of water potentials in soil-plant systems is possible with polyethylene glycol.--Copyright 1974, Biological Abstracts, Inc.
W75-07730

PERFORMANCE OF FLOOD-RESISTANT AND DEEP-WATER RICE IN RELATION TO GROWTH AND YIELD UNDER DIFFERENT CULTURAL PRACTICES,
Rice Research Station, Chinsura (India).

S. K. Datta, and B. Banerji.
Indian J Agric Sci. Vol 42, No 8, p 664-670, 1972, Illus.

Descriptors: *Rice, *Crop production, Soil moisture, Growth rates.
Identifiers: *India.

Three cultivars of rice (Oryza sativa L.)--2 deep-water types, viz. 'Baku' and 'Kalakhersail,' and a flood-resistant type, 'FR 43B'--were studied under deep-water and usual field conditions. The deep-water cultivars showed a significantly better performance for growth habit (plant height, stem length, number of internodes, number of nodal tillers, etc.) and yield attributes (panicle number and length, grains/panicle, grain and straw) under deep-water conditions than under usual field conditions, showing their distinct water-tolerant nature. The flood-tolerant cultivar showed better results under field conditions in most of the characters (number of main tillers, number of panicles, grain and straw yields). The deep-water cultivars can be cultivated in the low-lying areas likely to be under prolonged submergence. Nodal tillers contributed considerably to the production of grain and straw. Most of the nodal tillers arose from some specific active nodes (viz. 7th, 8th and 9th); their formation depended upon the level of water.--Copyright 1973, Biological Abstracts, Inc.
W75-07752

ESTIMATES OF ABUNDANCE OF FISHES IN THE OLSAVA CREEK, WITH RESPECT TO A LONG WINTER,
Ceskoslovenska Akademie Ved, Brno. Ustav pro Vyskum Obratlovcu.
J. Libosvarsky, and E. Wohlgemuth.
Zool Listy. Vol 22, No 1, p 78-83. 1973.

Descriptors: Fish population, Biomass, Environmental effects, Seasonal, Fisheries management.
Identifiers: *Czechoslovakia(Olsova Creek), Godio-Gobio, Leuciscus-cephalus, Noemacheilus-barbatulus, Phoxinus-phoxinus.

The size and species composition of the fish stock was investigated by successive removal of fish from 4 sections of the stream (in Czechoslovakia) by electro-fishing gear. The reliability of the data obtained was examined by computing coefficients of variation of both parameters of the method - the probability of capture and the estimate. The assumption of equal probability of capture of fish of different weight was charged with a systematic error. Thirteen species of fishes were captured: the total biomass varied between 23 and 1180 kg/ha; the numbers varied between 2.3 and 26.2 thousand fish/ha. Leuciscus cephalus, Noemacheilus barbatulus, Gobio gobio and Phoxinus phoxinus were aboundant by both weight and number. Following the long winter of 1961-1962, the number of fishes especially N. barbatulus and G. gobio decreased rapidly. The causes of the decrease are discussed. The zonation of the fishes is examined in the light of Huet's 'Regle des pentes.'--Copyright 1974, Biological Abstracts, Inc.
W75-07791

2J. Erosion and Sedimentation

NUTRIENT AND SEDIMENT PRODUCTION FROM FORESTED WATERSHEDS,
Nevada Agricultural Experiment Station, Reno.
For primary bibliographic entry see Field 5B.
W75-07353

SOME USES OF SOIL STABILIZERS IN THE USA,
Agricultural Research Service, Ames, Iowa. Soil and Water Conservation Research Div.
W. C. Moldenhauer, and D. M. Gabriels.
Meded Fac Landbouwwet Rijksuniv Gent. Vol 37, No 3, p 1076-1085, 1972.

Descriptors: *Soil stabilization, *Erosion control, Asphalt, United States, *Alcohols, Road construction, Construction.
Identifiers: Polyethylene film, *Polyvinyl alcohol, Straw.

Stabilizers are now being used particularly in highway and other construction projects where costs are less of a factor. Asphalt has some advantages over straw and polyethylene film for erosion prevention in such circumstances with respect to labor costs. Polyvinyl alcohol is very effective for controlling soil erosion in the field but has 1 disadvantage. It is only very slightly soluble so that the dry form is almost unusable. Dissolving and sealing the solution near the area of application may be feasible if the area is large enough. At the present costs of conditioners for erosion control are within acceptable range for highway, building, and military uses. For partial coverage of the soil surface on high-value crops their use is also economic. At the present application rates deemed necessary they are still far out of range for large-scale agriculture.--Copyright 1974, Biological Abstracts, Inc.
W75-07374

STRUCTURAL PROBLEMS OF INDONESIAN SOILS,
Lembaga Penelitian Tanah, Bogor (Indonesia).
For primary bibliographic entry see Field 2G.
W75-07394

AMOUNTS AND HYDROLYSIS OF PYROPHOSPHATE AND TRIPOLYPHOSPHATE IN SEDIMENTS,
Missouri Univ., Columbia. Dept. of Agronomy.
For primary bibliographic entry see Field 5A.
W75-07399

RECONNAISSANCE OF BOTTOM SEDIMENTS ON THE INNER AND CENTRAL NEW JERSEY SHELF (MESA DATA REPORT),
National Oceanic and Atmospheric Administration, Boulder, Colo. Marine Ecosystems Analysis Program.
For primary bibliographic entry see Field 2L.
W75-07425

DETERMINATION OF SAND ROUGHNESS FOR FIXED BEDS,
Queen's Univ., Kingston (Ontario). Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W75-07434

SOIL ERODIBILITY AS DETERMINED BY RAINDROP TECHNIQUE,
International Inst. of Tropical Agriculture, Ibadan (Nigeria).
E. Bruce-Okine, and R. Lal.
Soil Science, Vol 119, No 2, p 149-157, February 1975. 5 fig, 5 tab, 24 ref.

Descriptors: *Erosion rates, *Raindrops, *Soil moisture, *Africa, Tropic, Clay minerals, Clay loam, Sands, Rating curves, Soil texture, Water temperature, *Soil erosion.
Identifiers: *Raindrop technique, *Nigeria, Raindrop energy, Ped size, Soil moisture potential.

Aggregates of two tropical soils from western Nigeria were used to investigate the possibility of using the raindrop technique to determine the soil erodibility index as compared with soil behavior towards erosion under natural field conditions. Aggregate size, initial soil moisture potential, and raindrop temperature were tested for their effect on structural stability of the soils. High soil moisture potential (more negative) significantly increased the erodibility of a clayey soil containing expanding lattice clay minerals. The erodibility index of a sandy clay loam soil containing kaolinitic clay minerals and amorphous iron and aluminum oxides was slightly decreased when at high moisture potential. The increase in water temperature increased the erodibility of both soils. Erodibility was found to vary directly with sand and inversely with clay content. A routine laboratory method of evaluating the erodibility of a soil with a rating curve was proposed. (Lee-ISWS)
W75-07448

HUMIC MATTER IN NATURAL WATERS AND SEDIMENTS,
Fisheries Research Board of Canada, Winnipeg (Manitoba). Freshwater Inst.
For primary bibliographic entry see Field 5B.
W75-07453

SUSPENDED MARINE CLAY MINERAL IDENTIFICATION BY SCANNING ELECTRON MICROSCOPY AND ENERGY-DISPERSIVE X-RAY ANALYSIS,
Texas A and M Univ., College Station. Dept. of Oceanography.
N. J. Bassin.
Limnology and Oceanography, Vol 20, No 1, p 133-137, January 1975. 5 fig, 2 tab, 9 ref.

Descriptors: *Clays, *Electron microscopy, *X-ray analysis, *Suspended solids, *Marine geology, Analytical techniques, Clay minerals, Inorganic compounds, Mineralogy, Particle size, Silts, Water quality, X-ray diffraction, Microscopy, Non-destructive tests, Geomorphology.
Identifiers: *Caribbean Sea.

A technique enabling qualitative identification of clay mineral species commonly found in marine environments, on a particle-by-particle basis, permits electron microscopic and X-ray analysis examination of specific clay particles, without affecting either their morphology or association, on membrane ultrafilters containing as little as 0.2 mg of particulate matter. (Henley-ISWS)
W75-07472

GULLY EROSION, NORTHWESTERN COLORADO: A THRESHOLD PHENOMENON,
Texas Univ. at Austin. Dept. of Geological Sciences.
P. C. Patton, and S. A. Schumm.
Geology, Vol 3, No 2, p 88-90, February 1975. 2 fig, 7 ref.

Descriptors: *Gully erosion, *Sedimentation, *Geomorphology, Gullies, Erosion, Soil erosion, Valleys, Sediments, Alluvial fans, Arid lands, *Colorado.
Identifiers: *Discontinuous gullies, Piceance Creek(Colo), Yellow Creek(Colo).

The widespread occurrence of discontinuous gullies in the oil-shale region of northwestern Colorado is of particular concern because of the resulting progressive destruction of the valley floors. Furthermore, the integration of a semi-arid drainage network can cause a rapid increase in the sediment yield of the basin, with subsequent harmful effects downstream. Field work in the Piceance Creek and Yellow Creek drainage basins indicates that these discontinuous gullies developed on oversteepened segments of the valley floors. Although the critical slope of entrenchment is probably related to magnitude of runoff, discharge measurements are not available; therefore, drainage-basin area was selected as the most representative measure of discharge. An inverse relation between drainage-basin area and critical slope of entrenchment applies, and the lower limit of scatter of the data establishes a critical slope-area relation, which can be used to identify potentially unstably valley floors. This relation can help the land manager determine areas of instability where preventive measures can most economically and successfully be undertaken. It was stressed that this particular quantitative relation is

applicable only to the Piceance Creek and Yellow Creek drainage basins. In more heterogeneous basins, other variables will need to be included in the analysis; however, the general theory of valley stability will remain applicable. (Sims-ISWS)
W75-07477

BOTTOM CURRENT MEASUREMENTS IN THE LABRADOR SEA,
Lamont-Doherty Geological Observatory, Palisades, N.Y.
For primary bibliographic entry see Field 2L.
W75-07478

SEDIMENT IN IRRIGATION AND DRAINAGE WATERS AND SEDIMENT INPUTS AND OUTPUTS FOR TWO LARGE TRACTS IN SOUTHERN IDAHO,
Agricultural Research Service, Kimberly, Idaho. Snake River Conservation Research Center.
For primary bibliographic entry see Field 5G.
W75-07546

SOME SEDIMENT ASPECTS OF TROPICAL STORM AGNES,
Geological Survey, Reston, Va.
H. P. Guy, and T. L. Clayton.
ASCE Proceedings, Journal of the Hydroulics Division, Vol 99, No HY9, p 1653-1658, September 1973. 4 fig, 2 tab.

Descriptors: *Sediment yield, *Hurricanes, *Peak discharge, *Floods, *Virginia, Sedimentation, Erosion, Rainfall-runoff relationships, Storm runoff, Urban hydrology.
Identifiers: *Stave Run(Va).

Storms of unusual magnitude are of interest to scientists, engineers, governments, and certainly no less to the general populace. In June, 1972, tropical storm Agnes resulted in a large amount of rainfall over an unusually large area. This note documents the runoff and sediment aspects of this storm on the drainage basin of Stave Run at Reston, Va., on which a substantial part of the national headquarters building of the U.S. Geological Survey is located. Agnes caused an unusual amount of runoff and sediment to be conveyed by Stave Run, even though the peak intensity of runoff was relatively low. The low runoff intensity resulted from the relatively low precipitation intensity for small drainage areas. Of the 492 tons of sediment transported by the streamflow from the basin, 94% was silt-and-clay-sized particles. A computed 961 tons of sediment was eroded in the basin, of which 469 tons was deposited. The deposited material was estimated to contain an insignificant amount of clay, 43% silt-sized particles, 45% sand, and 12% gravel. (Knapp-USGS)
W75-07557

EFFECTS OF THE MAY 5-6, 1973, STORM IN THE GREATER DENVER AREA, COLORADO,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 2E.
W75-07582

A DIVER-OPERATED DREDGE FOR COLLECTING QUANTITATIVE BENTHIC SAMPLES IN SOFT SEDIMENTS,
Rice Univ., Houston, Tex.
A. A. Ekdale, and J. E. Warme.
J Paleontol, Vol 47, No 6 p 1119-1121, 1973. Illus.

Descriptors: *Sampling, Analytical techniques, Benthos, *Dredging, *Bottom sampling, Sediments.
Identifiers: Water-lift suction dredge.

A diver-operated water-lift suction dredge allows an investigator to collect underwater samples directly, maintain uniform samples size in soft sediments and overcome problems of shoveling or scooping underwater.--Copyright 1974, Biological Abstracts, Inc.
W75-07614

A MODEL FOR PREDICTING EROSION AND SEDIMENT YIELD FROM SECONDARY FOREST ROAD CONSTRUCTION,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 4C.
W75-07653

SEDIMENT AND EROSION CONTROL DESIGN CRITERIA,
Maryland Dept. of Natural Resources, Annapolis. Water Resources Administration.
For primary bibliographic entry see Field 4D.
W75-07672

PROCESS DESIGN MANUAL FOR SUSPENDED SOLIDS REMOVAL.
Hazen and Sawyer, New York.
For primary bibliographic entry see Field 5D.
W75-07712

BEACH FORMS AND COASTAL PROCESSES,
Columbia Univ., New York. Teachers Coll.
For primary bibliographic entry see Field 2L.
W75-07715

STUDIES ON SOIL EROSION CONTROL: 4. THE HYDRAULIC STUDIES OF WATER FLOW IN SLOPED LAND (IN JAPANESE),
Obihiro Zootechnical Univ. (Japan). Lab. of Agricultural and Civil Engineering.
For primary bibliographic entry see Field 4A.
W75-07756

BEACH EROSION CONTROL IMPROVEMENTS, WAIKIKI BEACH, OAHU, HAWAII (KAPAHULU STORM DRAIN TO THE ELKS CLUB) (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Corps of Engineers, Honolulu, Hawaii. Pacific Ocean Div.
For primary bibliographic entry see Field 8A.
W75-07780

DOES CANOEING INCREASE STREAMBANK EROSION,
Forest Service (USDA), St. Paul, Minn. North Central Forest Experiment Station.
E. A. Hansen.
North Central Forest Experiment Station, Research Note NC-186, 1975, 4 p, 3 fig, 1 tab, 6 ref.

Descriptors: *Bank stabilization, Stream erosion, *Stream improvement, Vegetation establishment, Boating, Camping, Recreation, *Michigan, Bank erosion.
Identifiers: *Streambank erosion, *Canoeing.

An increase in canoeists from 13,000 in 1966 to 64,000 in 1973 has not measurably accelerated streambank erosion. During this period as many streambanks healed naturally as there were new points of erosion. Many other banks were revegetating naturally. Most erosion was considered natural but people sliding and camping on the banks caused some erosion. To minimize streambank erosion, management efforts should be directed towards restricting streambank traffic and use rather than canoeing per se. (Forest Service)
W75-07792

FLUORIDE: GEOCHEMICAL AND ECOLOGICAL SIGNIFICANCE IN EAST AFRICAN WATERS AND SEDIMENTS,
Michigan Univ., Ann Arbor. Dept. of Zoology.
For primary bibliographic entry see Field 5B.
W75-07802

INDUSTRIALIZATION AFFECTS HEAVY METAL AND CARBON ISOTOPE CONCENTRATIONS IN RECENT BALTIC SEA SEDIMENTS,
Kiel Univ. (West Germany). Institut fuer Reine und Angewandte Kernphysik.
For primary bibliographic entry see Field 5B.
W75-07803

METHOD OF PROTECTION FOR SLOPES AND CRESTS OF RIVERS, CHANNELS, AND THE LIKE,
For primary bibliographic entry see Field 8F.
W75-07819

BEACH EROSION INVENTORY OF CHARLESTON COUNTY, SOUTH CAROLINA: A PRELIMINARY REPORT,
South Carolina Univ., Columbia. Dept. of Geology.
M. F. Stephen, B. J. Brown, D. M. FitzGerald, D. K. Hubbard, and M. O. Hayes.
South Carolina Sea Grant Technical Report Number 4, March 1975. 79 p, 36 fig. Tech. Report No 4. NOAA Grant SC-SG-75-4.

Descriptors: *Beach erosion, *Deposition(Sediments), *Sediments, Aerial photography, *South Carolina.
Identifiers: *Shoreline changes, *Erosion trends, Morphological variations, Tidal inlets, Set back lines, Erosion-deposition graphs, Transgressive barrier islands, State-wide beach profile, Erosional inventory reports, Coastal counties, *Charleston County(SC).

Rates of shoreline change measured from vertical aerial photographs between the years 1939 and 1973 allow classification of the Charleston County, South Carolina, coastline into four categories: areas of long term erosion, which have undergone relatively continuous erosion over the study interval; areas of long term accretion, which have undergone relatively continuous deposition over the study interval; unstable areas, with fluctuations in position of the shoreline greater than 50 feet over the study interval; and stable areas, with fluctuations in position of the shoreline of less than 50 feet over the study interval. Beach erosion and deposition trends are closely tied to the occurrence and morphological variations of tidal inlets. Shoreline sediment type and modifications made by man also strongly affect erosion and deposition trends. Limits for set back lines and areas suitable and unsuitable for development can be defined directly from the erosion-deposition graphs presented. (NOAA)
W75-07833

SHORELINE PROTECTION GUIDE FOR PROPERTY OWNERS,
New York Sea Grant Advisory Service, Albany.
For primary bibliographic entry see Field 8A.
W75-07835

2K. Chemical Processes

REAGENTS FOR DETERMINATIONS OF TRACE IMPURITIES IN WATER, PHASE II,
Southern Illinois Univ., Carbondale. Dept. of Chemistry and Biochemistry.
For primary bibliographic entry see Field 5A.
W75-07352

SOME CHEMICAL OBSERVATIONS ON THE UPPER SALT RIVER AND ITS TRIBUTARIES,
Arizona State Univ., Tempe.
M. R. Sommerfeld, R. D. Olsen, and T. D. Love.

Journal of the Arizona Academy of Science, Vol 9, No 3, p 78-81, October 1974. 1 fig, 3 tab, 7 ref.

Descriptors: *Chemical analysis, *Salts, *Water sampling, *Water chemistry, Rivers, Tributaries, Sodium chloride, *Arizona, Banks, Water types, Sodium, Potassium, Calcium, Magnesium.
Identifiers: *Salt River(Ariz).

Chemical characteristics were determined on water samples collected at several sites on the Salt River and its major tributaries in Arizona. The data confirmed that the Salt River has a high specific conductance and can be described as sodium chloride water. The analysis revealed that neither the salt banks and adjacent springs located beneath the Salt River Canyon bridge nor the four tributaries, Carrizo Creek, Cedar Creek, and the White and Black Rivers are the major source of the high dissolved salt content of the Salt River. Considerable differences among the major tributaries were revealed in the chemical analyses. The source of the large quantities of dissolved salts is confined either to the lower reaches of the major tributaries or a fairly inaccessible twenty mile stretch of the Salt River above U.S. Highway 60. (Mastic-Arizona)
W75-07369

WATER SUPPLY IN CENTRAL AND SOUTHERN APACHE COUNTY,
Arizona Water Commission, Phoenix.
For primary bibliographic entry see Field 4B.
W75-07370

HYDROLOGY AND GEOCHEMISTRY OF KARST TERRAIN, UPPER LOST RIVER DRAINAGE BASIN, INDIANA,
Indiana Univ., Bloomington. Dept. of Geology.
For primary bibliographic entry see Field 2F.
W75-07398

AMOUNTS AND HYDROLYSIS OF PYROPHOSPHATE AND TRIPOLYPHOSPHATE IN SEDIMENTS,
Missouri Univ., Columbia. Dept. of Agronomy.
For primary bibliographic entry see Field 5A.
W75-07399

MARINE POLLUTION MONITORING: STRATEGIES FOR A NATIONAL PROGRAM,
Scripps Institution of Oceanography, La Jolla, Calif.
For primary bibliographic entry see Field 5A.
W75-07418

CHANGE IN THE PHYSIOCOCHEMICAL COMPOSITION OF WATER UNDER THE EFFECT OF FELLINGS,
Severo-Kavkazskaya Lesnaya Opytnaya Stantsiya, Maykop (USSR).
For primary bibliographic entry see Field 5B.
W75-07429

NITRATE MEASUREMENTS USING A SPECIFIC ION ELECTRODE IN PRESENCE OF NITRITE,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5A.
W75-07433

LANDFORM-SOIL-VEGETATION-WATER CHEMISTRY RELATIONSHIPS, WRIGLEY AREA, N.W.T.: I. MORPHOLOGY, CLASSIFICATION, AND SITE DESCRIPTION,
British Columbia Univ., Vancouver. Dept. of Soil Science.
M. E. Walmsley, and L. M. Lavkulich.
Soil Science Society of America Proceedings, Vol 39, No 1, p 84-88, January-February 1975. 3 fig, 1 tab, 12 ref.

Descriptors: *Soil-water-plant relationships, *Water chemistry, *Permafrost, *Canada, Geomorphology, Alpine, Soil types, Soil horizons, Regolith, Bogs, Lichens, Vegetation, Arctic.
Identifiers: *Mackenzie Valley(Northwest Territories), Cryoturbation, Stone stripes, Krummholz vegetation, Histic epipedon, Polygonal bogs, Toposequence.

Five landforms occurring in the intermittent permafrost region of the Mackenzie Valley were described. The five landforms, consisting of distinct soil and vegetative characteristics occur on a transect from the 1170 m ASL (above sea level) position at the summit of Cap Mountain, Wrigley area, Northwest Territories, to approximately 500 m ASL at the base of the slope. Two soils meet the requirement of a histic epipedon. An area of stone stripe and stone ring formation was encountered at approximately 1000 m ASL and an extensive area of lichen-covered polygonal bogs occurred at approximately 500 m ASL. The soils were described in relation to environmental factors and the processes of cryoturbation causing intermittent horizons were discussed. (Visocky-ISWS)
W75-07435

HUMIC MATTER IN NATURAL WATERS AND SEDIMENTS,
Fisheries Research Board of Canada, Winnipeg (Manitoba). Freshwater Inst.
For primary bibliographic entry see Field 5B.
W75-07453

A CONTINUOUS TURBIDITY MONITORING SYSTEM FOR COASTAL SURFACE WATERS,
Old Dominion Univ., Norfolk, Va. Inst. of Oceanography.
For primary bibliographic entry see Field 5A.
W75-07471

SUSPENDED MARINE CLAY MINERAL IDENTIFICATION BY SCANNING ELECTRON MICROSCOPY AND ENERGY-DISPERSIVE X-RAY ANALYSIS,
Texas A and M Univ., College Station. Dept. of Oceanography.
For primary bibliographic entry see Field 2J.
W75-07472

THE DETERMINATION OF AMMONIA IN SEA-WATER,
Marine Biological Association of the United Kingdom, Plymouth (England). Plymouth Lab.
M. I. Liddicoat, S. Tibbitts, and E. I. Butler.
Limnology and Oceanography, Vol 20, No 1, p 131-132, January 1975. 4 ref.

Descriptors: *Ammonia, *Sea water, *Analytical techniques, Analysis, *Estimating, Chemistry, Spectrophotometry, Color reactions, Evaluation, Testing, Instrumentation, Laboratory tests, Testing procedures, Nitrogen compounds, Oceans, Ammonium compounds, Ultraviolet radiation.
Identifiers: *Phenolhypochlorite method, Indophenol, Potassium ferrocyanide.

A simple phenolhypochlorite method for the estimation of ammonia in seawater obeys Beer's Law over the concentration range 0-20 microgram-atoms NH3-N/liter; the standard deviation on a set of samples containing 4 microgram-atoms NH3-N/liter is 0.04. (Henley-ISWS)
W75-07474

TEMPERATURE MEASUREMENTS IN THE UPPER 10 M WITH MODIFIED EXPENDABLE BATHYTHERMOGRAPH PROBES,
Woods Hole Oceanographic Institution, Mass.
For primary bibliographic entry see Field 7B.
W75-07475

CHEMISTRY IN THE AQUATIC ENVIRONMENT,
Victoria Ministry for Conservation, Melbourne (Australia). Westernport Bay Environmental Study.
For primary bibliographic entry see Field 5A.
W75-07524

CHEMICAL QUALITY OF GROUND WATER IN HAWAII,
Geological Survey, Honolulu, Hawaii.
For primary bibliographic entry see Field 5A.
W75-07585

WATER-QUALITY RECONNAISSANCE OF SURFACE INFLOW TO UTAH LAKE,
Geological Survey, Salt Lake City, Utah.
For primary bibliographic entry see Field 5A.
W75-07586

DETERMINATION OF SMALL QUANTITIES OF CARBON DIOXIDE IN NATURAL WATERS,
Nagoya Univ. (Japan). Water Research Lab.
For primary bibliographic entry see Field 5A.
W75-07588

THE DETERMINATION OF NITRATE IN WATERS AT LOW PPM LEVELS BY AUTOMATIC DISCRETE-SAMPLE ANALYSIS,
Beckman Instruments, Inc., Irvine, Calif.
For primary bibliographic entry see Field 5A.
W75-07637

THE EFFECT OF SLAKED-LIME AND STRAW ON THE SOIL PH IN THE FLOODED AND UPLAND CONDITION (IN KOREAN),
Office of Rural Development, Suwon (Republic of Korea). Crop Experiment Station.
For primary bibliographic entry see Field 2G.
W75-07645

DEVELOPMENT OF A METHOD FOR THE EXTRACTION AND DETERMINATION OF NON-POLAR, DISSOLVED ORGANIC SUBSTANCES IN SEA WATER,
For primary bibliographic entry see Field 5A.
W75-07650

AUTOMATED ION-SELECTIVE ELECTRODE METHOD FOR DETERMINING FLUORIDE IN NATURAL WATERS,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 5A.
W75-07657

LIQUID CHROMATOGRAPHIC DETERMINATION OF NITROGLYCERIN PRODUCTS IN WASTE WATERS,
Radford Army Ammunition Plant, Va.
For primary bibliographic entry see Field 5A.
W75-07659

MARINE ALGAL ASSAY PROCEDURE BOTTLE TEST,
Pacific Northwest Environmental Research Lab., Corvallis, Ore.
For primary bibliographic entry see Field 5A.
W75-07686

HANDBOOK OF RADIOCHEMICAL ANALYTICAL METHODS,
National Environmental Research Center, Las Vegas, Nev. Technical Support Lab.
For primary bibliographic entry see Field 5A.
W75-07697

THE RAINFALL INTERCEPTION PROCESS AND MINERAL CYCLING IN A MONTANE RAIN FOREST IN EASTERN PUERTO RICO,
Puerto Rico Nuclear Center, San Juan. Terrestrial Ecology Program.
R. G. Clements, and J. A. Colon.
Available from the National Technical Information Service, Springfield, Va 22161 as CONF 740513-1, $4.00 in paper copy, $2.25 in microfiche. (1974) 25 p, 5 fig, 9 ref. Contract AT-(40-1)-1833.

Descriptors: *Rainfall, *Throughfall, Streamflow, Storms, Tropical regions, Radioisotopes, Vegetation, Radioactivity techniques, Chemistry, Interception, Rain forests, *Puerto Rico.
Identifiers: Foliar absorption.

A comprehensive interception was carried out in a montane rain forest in eastern Puerto Rico to measure contamination of terrestrial systems with radionuclides either from particulate fallout or isotopes associated with rainfall. Results showed that factors of intensity, duration, and overall distribution of storms by storm size must be considered in determining the fate of isotopes that reach the forest via rainfall. On the average, it required approximately 0.03 to 0.05 inch of rainfall, depending on antecedent conditions, to satisfy the wetting requirements of the vegetation and produce throughfall. Analysis of rainfall by 0.01-inch fractions indicated that the first 0.04 inch had the highest concentrations of Ca, Mg, Na, and K. Frequency distribution analysis of storms by storm class intervals of 0.1 inch showed that 69% of the storms were 0.1 inch or less. The small storms had a major impact on the chemical inputs to this tropical exosystem. (Roberts-ISWS)
W75-07727

EFFECT OF HYDROGEN ION CONCENTRATION ON THE DETERMINATION OF LEAD BY SOLVENT EXTRACTION AND ATOMIC ABSORPTION SPECTROPHOTOMETRY,
Purdue Univ., Lafayette, Ind., Dept. of Biochemistry.
For primary bibliographic entry see Field 5A.
W75-07793

COMPARISON OF ANALYTICAL TECHNIQUES FOR INORGANIC POLLUTANTS,
Laboratory of the Government Chemist, London (England).
For primary bibliographic entry see Field 5A.
W75-07794

DETERMINATION OF TRACE ELEMENTS IN COAL BY INSTRUMENTAL NEUTRON ACTIVATION ANALYSIS,
Ghent Rijksuniversiteit (Belgium). Instituut voor Nukleaire Wetenschappen.
For primary bibliographic entry see Field 5A.
W75-07799

2L. Estuaries

ECOLOGY OF THE PLANKTON OF PRUDHOE BAY, ALASKA,
Alaska Univ., College. Inst. of Marine Science.
For primary bibliographic entry see Field 5C.
W75-07407

A BIBLIOGRAPHY OF NUMERICAL MODELS FOR TIDAL RIVERS, ESTUARIES AND COASTAL WATERS,
Rhode Island Univ., Kingston. Dept. of Ocean Engineering.
R. Gordon, and M. Spaulding.
Marine Technical Report 32, 1974. 55 p. $2.00. (NOAA-75032408). NOAA Grant OSG 04-3-158-3.

Descriptors: Documentation, *Bibliographies, *Model studies, Mathematical models, *Mathematical studies, Mathematics, *Tidal waters, *Estuaries, Information exchange, Data collections, Publications, Reviews, Technical writing, Statistical models, Analytical techniques, Estimating, Theoretical analysis, Numerical analysis, Indexing.
Identifiers: Catalogs, Deterministic models, Statistical models, *Coastal waters, Tidal rivers, KWIC index, Author index, Corporate index, Inverted index.

This document catalogs 164 items of literature available in the field of numerical modeling for tidal rivers, estuaries, and coastal waters. Included models are of both a deterministic and statistical nature. The deterministic models in this classification use such forcing functions as tidal height, wind stress, density gradients, etc. in determining the velocity field. A limited number of models have been included which do not fit this description. Included are a document listing, a selected review and four indices: (a) keyword-in-context (KWIC) index, (b) author index, (c) corporate index, and (d) inverted index. (NOAA)
W75-07409

PORT DESIGN AND ANALYSIS METHODOLOGY,
Massachusetts Inst. of Tech., Cambridge. Sea Grant Project Office.
For primary bibliographic entry see Field 8A.
W75-07410

TEACHING COASTAL ZONE MANAGEMENT: AN INTRODUCTORY COURSE SYLLABUS,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
D. W. Ducsik.
Sea Grant Report No. MITSG 75-1, September 30, 1974. Index No. 75-101-Cdi. 14 p, 4 fig, 20 ref, append. (NOAA-74121605) NOAA Grant NG-43-72.

Descriptors: *Management, *Education, *Water resources, Resources, Coasts, Ecology, Economics, Law of the sea, Environment.
Identifiers: *Coastal zone management, *Syllabus.

The experience of developing and teaching a graduate level subject in coastal zone management at M.I.T. during the 1973-1974 academic year is reported. The objective of the subject is to introduce students with a variety of backgrounds to the wide range of problems and policy issues surrounding human use of the land-sea interface. The primary emphasis is on the allocation of shorelands, where the range of competing uses is the greatest and the possibilities for conflict most pronounced. Discussions include the physical and ecological processes characteristic of shoreland areas; the human activities placing demands on the coastal resources base; the incidence and magnitude of adverse affects on ecological and amenity values; the institutional setting of coastal decision making; recent legislative developments; and special problem areas and critical policy issues. (NOAA)
W75-07411

INVESTIGATIONS ON CONCENTRATIONS, DISTRIBUTIONS, AND FATES OF HEAVY METAL WASTES IN PARTS OF LONG ISLAND SOUND,
Connecticut Univ., Groton. Marine Sciences Inst.
For primary bibliographic entry see Field 5B.
W75-07412

TOXAPHENE INTERACTIONS IN ESTUARINE ECOSYSTEMS,
Georgia Univ., Savannah. Marine Extension Center.
For primary bibliographic entry see Field 5C.
W75-07414

ENVIRONMENTAL STUDIES OF AN ARCTIC ESTUARINE SYSTEM--FINAL REPORT,
Alaska Univ., College. Marine Science Inst.
Environmental Studies of an Arctic Estuarine System-Final Report; IMS Report R74-1; Sea Grant Report No. 73-16, 1974, 539p. (NOAA-75022106) EPA 16100EDM NOAA Grant OSG 04-3-158-41.

Descriptors: *Estuarine environment, *Arctic, *Alaska, Polar regions, Lagoons, Waves(Water), Currents(Water), Winds, Beaches, Geomorphology, Sedimentology, Sedimentation, Mineralogy, Geochemistry, Ice, Nutrients, Chemical analysis, Phytoplankton, Aquatic life, Aquatic plants, Benthos, Estuarine fisheries, Birds, Fish, Benthic fauna.
Identifiers: *Arctic estuarine system, *Colville River(AK), Fast ice, Beaufort Sea(AK), Arctic birds.

The Colville River estuarine system was studied with respect to physical, chemical, geomorphological and biological factors over a period of four years. A detailed account is given of wind, waves, and currents in a lagoon; beach morphology and sedimentology in a lagoon; aspects of size distributions, mineralogy and geochemistry of deltaic and adjacent shallow marine sediments of North Arctic Alaska; fast ice on the northern coast of Alaska; seasonal variations in the nutrient chemistry and conservative constituents in coastal Alaskan Beaufort Sea waters; primary productivity and phytoplankton organisms in the Colville River system; nearshore benthos; and Colville River delta fisheries research. A summary of observations of birds at Oliktok Point and notes on birds observed along the Colville River are included. (NOAA)
W75-07417

MARINE POLLUTION MONITORING: STRATEGIES FOR A NATIONAL PROGRAM,
Scripps Institution of Oceanography, La Jolla, Calif.
For primary bibliographic entry see Field 5A.
W75-07418

ENGINEERING CONSIDERATIONS FOR MARINAS IN TIDAL MARSHES,
Delaware Univ., Newark. Dept. of Civil Engineering.
College of Marine Studies, Sea Grant Publication DEL-SG-9-74, November 1974. 114 p, 18 fig, 20 tab, 22 ref. NOAA Contract 04-3-158-30.

Descriptors: *Estuaries, *Tidal marshes, *Marinas, Engineering, Management, Recreation facilities, Environmental engineering, Water resources, Economics, Design criteria, *Coastal engineering.
Identifiers: Environmental impact, Coastal zone management, Commercial fisheries.

Design guidelines have been developed to incorprate the desirable qualities of the marsh in a marina, thereby reducing the environmental impact. When a marina displaces marshland, the most important quality which must be maintained is biological production. The methods suggested and recommended for the preservation of this quality are: flush the marina to promote water circulation which cycles nutrients and prevents eutrophication; use dredge spoils from the marsh to establish new productive marshes elsewhere; provide contact area within the marina so fouling communities, an organic food source, can prosper and multiply; control water quality so that estuarine species can thrive in the marina; and provide an equal amount of organic food in the marina to make up for the loss of food from displaced marshland. To indicate how a complementary marina-marsh system could be achieved, an example of a composite design using these guidelines is also presented. (NOAA)
W75-07420

RECONNAISSANCE OF BOTTOM SEDIMENTS ON THE INNER AND CENTRAL NEW JERSEY SHELF (MESA DATA REPORT),
National Oceanic and Atmospheric Administration, Boulder, Colo. Marine Ecosystems Analysis Program.
W. L. Stubblefield, M. Dickon, and J. P. Swift.
Available from the Superintendent of Documents, U.S. Gov't Printing Office, Washington, D.C. 20402. NOAA Environmental Research Laboratories Marine Ecosystems Analysis Program MESA Report No. 1, July 1974. 39 p, 6 fig, 4 tab, 8 ref. (NOAA-74111811).

Descriptors: *Continental shelf, *Bottom sediments, *Waste disposal, Coasts, Sediments, Petrography, Resources, Fisheries, Sediment transport, Data collections, *New Jersey.
Identifiers: *Environmental impact, *Grain-size distribution, Mineral resources, Food supply.

The petrography of samples from two areas on the New Jersey Shelf was analyzed to resolve the relation between surficial grain-size distribution, hydraulic regime, and bathymetry. Determination of this relation is essential to understanding of the sediment flux in these areas and is a critical parameter for environmental impact problems. The sample localities are presently undergoing, or are being considered for, a variety of conflicting usages, including food resources (fishing), mineral resources (beach borrow), and waste disposal (dredge spoil and sewage). The samples were examined for grain-size distribution in quarter-phi intervals and for related statistical parameters which include mean grain size, standard deviation, skewness, and kurtosis. A mean grain-size distribution map for each area suggests a relation between bathymetry and grain-size distribution which, in turn, defines certain features of a hydraulic regime. Selected samples were further examined for relative percent of detritus, clay pebbles, fauna content, and heavy mineral concentrations. The individual metrographical parameters are presented in tabular form. (NOAA)
W75-07425

TIDES AND TIDAL CURRENTS OF NARRAGANSETT BAY,
Rhode Island Univ., Kingston. Dept. of Ocean Engineering.
M. Spaulding, and C. Swanson.
Marine Technical Report Number 35, 1974. 40 p, 27 fig, 13 tab. (NOAA-74122701).

Descriptors: *Tides, *Charts, *Rhode Island, Recreation, Data collections.
Identifiers: *Tidal currents, *Oceanographic data, *Tidal heights, *Narragansett Bay(RI).

The tidal current and height charts for Narragansett Bay have been created primarily for the recreational user, notably the sailor. The charts show the hourly velocity to the nearest tenth of a knot, and direction of the tidal currents by means of arrows. A series of hourly tidal height charts shows the height to the nearest tenth of a foot above mean sea level throughout the bay. Also included is a table, on which the charts are based, which gives the time and range of the tides at Newport, Rhode Island, from 1975 to 1984. This table is divided into one month per page and subdivided into columns of times and ranges for each year. The time is based on a 24-hour clock, Eastern Standard Time (EST), and the range is the difference in feet between high water at the time shown and the next low water. The charts were generated under the assumption of no wind, constant river flow, and no atmospheric pressure gradient over the bay, i.e. no storm. There is one tidal current chart and one tide height chart for each hour after high tide at Newport giving a total of 13 current and height charts covering one tidal cycle. Included is a table of factors for correcting velocity and height for various tidal ranges. (NOAA)
W75-07426

BISCAYNE BAY: ENVIRONMENTAL AND SOCIAL SYSTEMS.
Miami Univ., Coral Gables, Fla.
University of Miami Sea Grant Special Report Number 1, March 1975, Susan U. Wilson (ed). 51 p, 9 fig, ref, 3 append. (NOAA-75040203) $3.00. Special Report No. 1 NOAA Grant OSG 04-5-158-14.

Descriptors: *Bays, *Estuaries, *Florida, Inlets(Waterways), Shores, Aquatic environment, Coastal plains, Intertidal areas, Geology, Geologic formations, Geomorphology, Environmental effects, Climatology, Climatic data, Weather, Weather data, Currents(Water), Water circulation, Waves, Water quality, Water quality control, Biota, Political aspects, Area redevelopment, Jurisdiction, Water resources development, Land use, Industries, Recreation, Transportation, Utilities.
Identifiers: *Biscayne Bay(Fl), *Environmental systems, *Social systems, Political jurisdications, Residential land use, Commerce, Miami(Fl).

Described are Biscayne Bay, its uses, and how man has modified it and its shores. The various environmental systems are described in detail including geology, climate and weather, tides and currents, water quality, and biota. Social systems are also addressed, including political jurisdictions, residential land use, industry and commerce, recreation, public land use, and transportation and utilities. (NOAA)
W75-07427

COASTAL BREAKUP IN THE ALASKAN ARCTIC,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
For primary bibliographic entry see Field 2C.
W75-07445

NEARSHORE CURRENT PATTERNS ALONG THE CENTRAL CALIFORNIA COAST,
California Univ., Santa Cruz. Div. of Applied Sciences.
G. B. Griggs.
Estuarine and Coastal Marine Science, Vol 2, No 4, p 395-405, October 1974. 4 fig, 4 tab, 15 ref.

Descriptors: *Ocean currents, *Coasts, *California, *Pacific Ocean, Currents(Water), Oceanography, Ocean circulation, Seasonal.
Identifiers: *Nearshore ocean currents.

Sea surface and seabed drifters indicated that nearshore current patterns change seasonally along the central California coast in the Monterey Bay area. The winter months are characterized by a well-defined northward flow (Davidson Current) with average monthly speeds of 3 to 11 km/day. During the spring, surface flow reverses and the southward flowing California current dominates with average nearshore speeds of 4 to 10 km/day. Drift during the summer and fall is quite variable with occasional reversals of direction. These fluctuations seem to be partly due to the presence of eddies associated with the California Current system and partially to local wind patterns. Although near bottom drift varies, a northward flow predominates throughout the year with average speeds of 0.3 to 0.6 km/day. Although offshore currents do appear to flow in and out of Monterey Bay, circulation in the bay is much slower than that in the offshore area thereby making it highly susceptible to pollutant accumulation. (Jess-ISWS)
W75-07449

PHYSICAL AND BIOLOGICAL CHARACTERISTICS OF AN UPWELLING AT A STATION OFF LA JOLLA, CALIFORNIA DURING 1971,
Dalhousie Univ., Halifax (Nova Scotia). Dept. of Oceanography.
D. Kamykowski.
Estuarine and Coastal Marine Science, Vol 2, No 4, p 425-432, October 1974. 2 fig, 1 tab, 22 ref. ONR Contract N00014-69-A0200-6006.

Descriptors: *Upwelling, *Aquatic life, Phytoplankton, Pacific Coast region, *California, Oceans, Physical properties, Biological properties, Environment, On-site investigations, Advection, Marine biology, Ecology.
Identifiers: La Jolla(Calif).

A station located 1 km west of Scripps Institution of Oceanography pier La Jolla, California, was occupied 15 times in the 57-day period from February 9 to April 7, 1971. The condition of the environment and of the phytoplankton community was observed before, during, and after a major upwelling (February 26 to March 1). Classical interaction between the environment and the phytoplankton was followed for three weeks after the strong WNW winds declined. The biological succession initiated by the upwelling ended on March 22 when a new water mass marked by a high silicate concentration apparently entered the area by surface transport. (Jess-ISWS)
W75-07450

THE APPLICATION OF REGIONAL GEOCHEMICAL RECONNAISSANCE SURVEYS IN THE ASSESSMENT OF WATER QUALITY AND ESTUARINE POLLUTION,
Imperial Coll. of Science and Technology, London (England). Applied Geochemistry Research Group.
For primary bibliographic entry see Field 5B.
W75-07469

A CONTINUOUS TURBIDITY MONITORING SYSTEM FOR COASTAL SURFACE WATERS,
Old Dominion Univ., Norfolk, Va. Inst. of Oceanography.
For primary bibliographic entry see Field 5A.
W75-07471

TEMPERATURE MEASUREMENTS IN THE UPPER 10 M WITH MODIFIED EXPENDABLE BATHYTHERMOGRAPH PROBES,
Woods Hole Oceanographic Institution, Mass.
For primary bibliographic entry see Field 7B.
W75-07475

WAVE-INDUCED NEARSHORE CIRCULATION,
Tetra Tech, Inc., Pasadena, Calif.
E. K. Noda.
Journal of Geophysical Research, Vol 79, No 27, p 4097-4106, September 20, 1974. 13 fig, 23 ref. ONR Contract N00014-69-C-0107.

Descriptors: *Water circulation, *Shores, *Waves(Water), Circulation, Lakes, Oceans, Currents(Water), Mathematical models, Ocean currents, Oceanography, Theoretical analysis.
Identifiers: Nearshore circulation.

A theoretical analysis of nearshore wave-induced circulation patterns produced by the interaction of incoming waves and local bottom topography was presented. This interaction results in a spatial variation of wave characteristics that produces a possible driving mechanism for nearshore circulation patterns. Both normal and oblique wave incidence were considered with the imposed beach profiles developed from an examination of prototype data. The analytical model results were compared with field measurements and they yield optimistic results. (Jess-ISWS)
W75-07476

BOTTOM CURRENT MEASUREMENTS IN THE LABRADOR SEA,
Lamont-Doherty Geological Observatory, Palisades, N.Y.
P. D. Rabinowitz, and S. L. Eittreim.

Journal of Geophysical Research, Vol 79, No 27, p 4085-4090, September 20, 1974. 4 fig, 1 tab, 15 ref. ONR N00014-67-A-0108-0004; NSF Grants GA-27281, GA-41657.

Descriptors: *Ocean currents, Measurement, *Sediments, *Hydrologic data, *Sedimentology, *Atlantic Ocean, Photography, Currents(Water), Flow, Overflow, Current meters, *Canada, *Continental margin.
Identifiers: *Bottom current, *Labrador Sea, Denmark Strait, Underwater camera, Deep sea basin.

Twenty-one spot current meter measurements documented a high-velocity bottom flow in places greater than 20 cm/sec around the periphery of the Labrador basin and Greenland continental margin. These data were consistent with previous hydrographic and current measurements in the area. Simultaneously obtained sea floor photographs showed sedimentological features consistent with the magnitudes and directions of flow measured by current meter. (Lee-ISWS)
W75-07478

CASCADE THEORY OF TURBULENCE IN A STRATIFIED MEDIUM,
City Coll., New York.
C. M. Tchen.
Tellus, Vol 27, No 1, p 1-14, January 1975. 1 tab, 15 ref.

Descriptors: *Turbulence, *Oceans, *Thermal properties, *Buoyancy, *Momentum equation, Mathematical studies, Viscosity, Energy, Equilibrium, Heat flow, Atmosphere, Analytical techniques.
Identifiers: *Spectral structure, *Cascade theory.

The turbulent motions in oceans and in the atmosphere often deal with the effects of buoyancy. A momentum equation was coupled with an equation of thermal fluctuations through the buoyancy force. The Kolmogoroff law of turbulent spectrum is valid in a neutral medium. The cascade transfer across the spectrum is governed by the rate of energy dissipation. In a stratified medium, the spectral laws are more complex. An analytical theory of turbulence in such a medium was developed. The difficulty of analytical theories resides in the closure of correlation hierarchy. The proposed method of cascade decomposition breaks the homogeneity of the quadruple correlation by injecting a preferential pair coupling between the different modes and by degenerating the quadruple correlation into a product of two double correlations of different ranks. One of the double correlations appears in the form of eddy viscosity. The determination of its spectral structure, or equivalently, the problem of the approach to equilibrium, involves a memory-chain of many relaxations. This requires the use of a repeated cascade. (Singh-ISWS)
W75-07481

A REVIEW OF INITIAL INVESTIGATIONS TO UTILIZE ERTS-1 DATA IN DETERMINING THE AVAILABILITY AND DISTRIBUTION OF LIVING MARINE RESOURCES,
National Aeronautics and Space Administration, Bay Saint Louis, Miss. Earth Resources Lab., and National Marine Fisheries Service, Bay Saint Louis, Miss. Fisheries Engineering Lab.
For primary bibliographic entry see Field 7B.
W75-07490

MARINE RESOURCES,
National Aeronautics and Space Administration, Bay, Saint Louis, Miss., Earth Resources Lab.
For primary bibliographic entry see Field 7B.
W75-07502

CONSTITUTIONAL RESTRICTIONS ON COASTAL LAND USE,
Oregon State Land Conservation and Development Commission, Portland.
For primary bibliographic entry see Field 6E.
W75-07515

WATER QUALITY PLANNING FOR THE DELAWARE ESTUARY - AN EXAMPLE,
Rutgers - the State Univ., New Brunswick, N.J. Water Resources Research Inst.
For primary bibliographic entry see Field 5G.
W75-07519

COASTAL SALINITY RECONNAISSANCE AND MONITORING SYSTEM--SOUTH COAST OF PUERTO RICO,
Geological Survey of Puerto Rico, San Juan.
For primary bibliographic entry see Field 5A.
W75-07553

EFFECT OF PORT ORANGE BRIDGE-CAUSEWAY ON FLOW OF HALIFAX RIVER, VOLUSIA COUNTY, FLORIDA,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 4C.
W75-07555

WATER QUALITY OF TAMPA BAY, FLORIDA: DRY-WEATHER CONDITIONS, JUNE 1971,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 5A.
W75-07556

DYE-DISPERSION STUDY ON LAKE CHAMPLAIN, NEAR CROWN POINT, NEW YORK,
Geological Survey, Albany, N.Y.
For primary bibliographic entry see Field 5B.
W75-07571

THE SEASONAL CYCLE OF GROWTH AND PRODUCTION IN THREE SALT MARSHES ADJACENT TO THE SAVANNAH RIVER,
Skidaway Inst. of Oceanography, Savannah, Ga.
G. L. McIntire, and W. M. Dunstan.
Technical Report Series No 75-2, (1975). 18 p, 6 fig, 3 tab, 13 ref. NOAA Grant OSG R/EE-2(04-3-158-6).

Descriptors: *Salinity, *Detritus, Food chains, Effluents, *Salt marshes, *Productivity, *Georgia, *Growth rates, Growth stages.
Identifiers: *Seasonal cycle, Spartina alterniflora, Growth parameters, *Savannah River marsh(GA), Total dry weight, Ash-free dry weight, Environmental perturbations.

Three geographically similar Spartina alterniflora marshes near Savannah, Georgia were studied monthly during 1974. Production levels, percent ash, and other growth parameters were measured. While general growth trends were similar at all three sites, the levels of production varied significantly with the marsh on the Savannah River showing the greatest production. Measurements of standing dead Spartina revealed a ready supply of detrital energy which is available to the adjacent estuarine regions throughout the year. The Savannah River marsh demonstrated that studies of river systems with high levels of industrial and municipal effluents must consider increased plant production as well as inhibitory or toxic effects. This study is a first step towards a 'condition index' for coastal salt marshes which would enable industrial and governmental agencies to determine the effects of environmental perturbations on these important natural resources. (NOAA)
W75-07713

BEACH FORMS AND COASTAL PROCESSES,
Columbia Univ., New York. Teachers Coll.
W. E. Yasso, and Elliott M. Hartman, Jr.
Beach Forms and Coastal Processes, MESA New York Bight Atlas, Monograph 11, January 1975. 51 p, 37 fig, 3 tab, 49 ref.

Descriptors: *Geomorphology, *Landforms, *Coasts, Headlands, Estuaries, Islands, Littoral drift, Jetties, Groins, Beach erosion, New York.
Identifiers: *Barrier spit, *Barrier bars, *Ocean facing shorelines, Wave refraction, *New York Bight Coast(NY).

Headlands, estuaries, a barrier spit, and barrier bars and islands separated from the mainland by shallow lagoons are the major landforms of the New York Bight coast. Bight beaches are subject to both annual and long-term changes in shape and position typical of ocean-facing shorelines. Wave refraction causes littoral drift of beach sand in a predominantly westward direction along the south sore of Long Island. Northward littoral drift predominates along the New Jersey coast north of Dover Township. South of Dover Township the drift is predominantly southward. Jetties and groins temporarily block littoral drift; they do not stop beach erosion entirely. Coastal storms and man's encroachment onto beaches amplify the normal erosion of waves, wind, and tide. Many people fail to learn from storms and from natural erosion that building on beaches and dunes should be avoided. (NOAA)
W75-07715

PROCEEDINGS OF A CONFERENCE ON MANAGEMENT OF DREDGE ISLANDS IN NORTH CAROLINA ESTUARIES,
North Carolina Univ., Wilmington. Dept. of Biology.
J. F. Parnell, and R. F. Soots.
Report UNC-SG-75-01, May 1974. 142 p, 18 fig, 2 tab. NOAA Grant OSG 04-3158-40.

Descriptors: *Management, *Estuaries, *Wildlife, Dikes, *North Carolina, Environmental effects, Fish population, Birds, *Habitats.
Identifiers: *Dredge islands(NC), Estuarine ecosystem, Coastal birds, Colonial birds, Dredge material, Bird population, *Spoil.

The process of removing substrate materials from navigation channels has resulted in the creation of many small estuarine islands. While the dredging process that creates these islands is generally considered detrimental to estuarine ecosystems, recent research has shown that dredge islands are valuable as nesting sites for many coastal birds. This conference was designed to bring the results of this research to the attention of the agencies and organizations with responsibilities and interests in the estuaries and to explore the possibilities and problems of managing these islands for wildlife, particularly nesting colonial birds. Speakers were selected to cover the major aspects of management and to represent the views of the agencies that would be directly or indirectly involved in such a management program. The conference brought together over 70 people from 24 state or federal agencies and private organizations. (NOAA)
W75-07716

THE WATER QUALITY AND TIDAL FLUSHING CHARACTERISTICS OF THREE SMALL BOAT BASINS; DES MOINES MARINA, EDMONDS HARBOR, AND NEWPORT SHORES,
Washington Univ., Seattle. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W75-07726

POPULATION AND BIOMASS DYNAMICS OF ZOOBENTHOS OF THE SOUTHERN ARAL SEA REGION AND CHANGE IN THE FOOD BASE OF BOTTOM-FEEDING FISH, (IN RUSSIAN).
Interdisciplinary Inst. of Natural Sciences, Nukus (USSR).

B. Bekmurzaev.
Uzb Biol Zh. Vol 17, No 6, p 49-51. 1973.

Descriptors: *Biomass, *Benthos, *Bottom fish, Fish food organisms, Bays.
Identifiers: *Aral Sea, USSR.

Quantitative data are presented on the zoobenthos and its seasonal changes in the Sarbas, Abbas and Dzhaltyrbas Bays of the Aral Sea (Uzbek SSR, USSR). In 1962-1968, 110 benthic forms and species were found in the coastal part of the southern Aral. Sarbas and Abbas Bays were the richest in number of species and forms, 68 and 57 respectively. The quantitative composition of Dzhaltyrbas Bay was poorer (48). The change in the zoobenthos is intimately related with a reduction of the runoff of the Amu-Darya River and of the coastal regions of the sea. As a result of this runoff, the total biomass of food invertebrates has decreased.--Copyright 1974, Biological Abstracts, Inc.
W75-07733

POSSIBILITIES FOR THE USE AND EVALUATION OF BRINY ZONES (ESTUARIES, LAGOONS ETC.) IN PARTICULAR BY AQUACULTURE, (IN FRENCH),
Paris-7 Univ. (France). Lab. of Physics of Biological Structures.
M. Petitjean.
Trav Mus Hist Nat Grigore Antipa. Vol 13, p 109-136. 1973, Illus.

Descriptors: *Aquiculture, Estuaries, Lagoons.
Identifiers: *Myxohaline zones.

Various myxohaline aquatic zones are discussed with respect to their use in aquaculture as a means of combating the current worldwide protein shortage. The productivity of these bodies of water is superior to that of both marine and freshwater areas. Also stressed is the greater sensitivity of these waters to external influences and the need for careful detailed study of the harmful effects involved in using these regions as food sources.--Copyright 1974, Biological Abstracts, Inc.
W75-07739

PHYSICO-CHEMICAL STUDY OF THE WATERS AND SEDIMENTS OF THE BRACKISH WATER POND OF BAGES-SIGEAN, (IN FRENCH).
Arago Lab., Banyuls-sur-Mer (France).
M. Fiala.
Vie Milieu Ser B Oceanogr. Vol 23, No 1, p 21-50, 1972/1973, Illus, English summary.

Descriptors: *Lagoons, Water chemistry, Phytoplankton, *Salinity, *Sediments, Nutrients, *Brackish water.
Identifiers: *France(Bages-Sigean).

A 1 yr study was conducted on the lagoon of Bages-Sigean to determine its main physicochemical characteristics. Its connection with the sea brings an increasing gradient of salinity from north (8%) to south (36%). Under mediterranean climatic conditions, the surface waters show sudden variations of temperature and salinity. Another particularity is the richness of compounds in the waters and in the sediments, necessary to the life of microorganisms. The surface waters hold an average of 3 mg/l glucose, from 0.1-0.8 mg/l nitrate and 8-10 microgram/l phosphate. The large variations during the year seem to be in connection with the strong freshening: This richness in mineral nutritive salts gives rise to the development of abundant phytoplankton. The sediments are richer than the waters in glucose (10 times) and phosphates (about 20 times). They are also characterized by their instability.--Copyright 1974, Biological Abstracts, Inc.
W75-07743

DISTRIBUTION OF COLIFORM BACTERIA IN THE COASTAL WATER, (IN JAPANESE),
Tokai Univ., Tokyo (Japan). Coll. of Marine Science and Technology.
For primary bibliographic entry see Field 5B.
W75-07744

NORMATIVE ASPECTS OF SCIENTIFIC RESEARCH IN THE OCEANS, THE CASE OF MEXICO,
Rhode Island Univ., Kingston. Law of the Sea Inst.
For primary bibliographic entry see Field 6E.
W75-07775

STUDIES ON EFFECTS OF THERMAL POLLUTION IN BISCAYNE BAY, FLORIDA,
Rosenstiel School of Marine and Atmospheric Science, Miami, Fla.
For primary bibliographic entry see Field 5C.
W75-07790

CLAVICEPS PURPUREA ON SPARTINA IN COASTAL MARSHES,
Gulf Coast Research Lab., Ocean Springs, Miss.
For primary bibliographic entry see Field 5C.
W75-07827

CONTRIBUTION OF FUNGI TO BIODEGRADATION OF SPARTINA AND OTHER BRACKISH MARSHLAND VEGETATION,
Louisiana State Univ., Baton Rouge. Dept. of Food Science.
For primary bibliographic entry see Field 5C.
W75-07828

BEACH EROSION INVENTORY OF CHARLESTON COUNTY, SOUTH CAROLINA: A PRELIMINARY REPORT,
South Carolina Univ., Columbia. Dept. of Geology.
For primary bibliographic entry see Field 2J.
W75-07833

3. WATER SUPPLY AUGMENTATION AND CONSERVATION

3A. Saline Water Conversion

WATER DESALTING IN HAWAII,
Holmes and Narver, Inc., Anaheim, Calif. Nuclear and Systems Sciences Group.
J. M. Duncan, and B. J. Garrick.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-241 706, $5.25 in paper copy, $2.25 in microfiche. OSW Report INT-OSW-RDPR-75-1001, June 1974, 93 p, 40 fig, 9 tab, 33 ref, 2 append. (Hawaii Department of Land and Natural Resources Report R50). OSW 14-30-3093.

Descriptors: Desalination, *Desalination plants, Municipal water, *Water supply, Water costs, *Hawaii, *Bracksih water, Planning, Reverse osmosis, Electrodialysis, Ion exchange, Cost comparisons, Alternative costs, *Cost analysis.

Possible applications were studied for water desalting in Hawaii. General water supply features of the islands are discussed. The areas most appropriate for the study of desalting were the Kihei-Makena (Maui) and the Kihola (Hawaii) sectors. There is little need for seawater desalting in the islands in view of the abundance of brackish waters of moderate salinity. This study was limited to the brackish waters and the electrodialysis, reverse osmosis, and ion exchange processes. Electrodialysis and reverse osmosis are the most economical desalting methods for potential use. For Maui island, water from a 1-million gallon per day electrodialysis plant operating at 50 percent plant factor and producing a water quality of 500 parts per million total dissolved solids (TDS) from brackish feed water of about 1,000 parts per million TDS would cost between 100 and 117 cents per 1,000 gallons. If a 90-percent plant factor can be achieved, the cost of this water would be reduced to between 67 and 78 cents per 1,000 gallons. By comparison current water rates in Hawaii average less than 40 cents per 1,000 gallons. No costing of alternative fresh water supplies is provided. Desalted waters would have only limited promise since the fresh water alternatives are more economical. The importance is emphasized of this information as input to the on-going Hawaii Water Resources Regional Study.
W75-07506

RESEARCH ON PIEZODIALYSIS - FOURTH REPORT,
Ionics, Inc., Watertown, Mass.
F. Leitz, J. Shorr, K. Sims, S. Spencer, and D. Carlson.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-236 613, $5.25 in paper copy, $2.25 in microfiche. Report INT-OSW-RDPR-74-988, May 1973. 110 p, 28 fig, 14 tab, 7 ref, 2 append. 14-01-0001-2333.

Descriptors: *Desalination, *Membrane processes, *Membranes, *Dialysis, *Electro-osmosis, Separation techniques, Waste water treatment, Measurement.
Identifiers: *Piezodialysis, *Mosaic membranes, Charge-mosaic membranes, Latex-polyelectrolyte membranes, Composite membranes, Salt flux.

Considerable progress has been made both in theoretical treatment of piezodialysis and in development of appropriate membranes for this process since the last status report (See W73-11154). The theoretical treatment has been expanded. Overall flux coefficients have been defined for a composite membrane and related to the flux coefficients for the component resins. These relationships provide considerable insight into the piezodialysis process. Equivalent symmetrical coefficients were derived for unsymmetrical membranes. Techniques have been developed for measurement of conductivity and water transport factors of component resins in a composite membrane. These measurements were made on a very good example of latex-poly-electrolyte membrane. The agreement between calculated and measured salt and water fluxes was good, considering the wide divergence between the structure of the idealized model and the likely membrane morphology. Divergences between calculated and measured permeate concentration suggest some possible changes in morphology under flow conditions. Membrane development work was concentrated on the latex-polyelectrolyte membrane. This type of membrane consists of a styrenebutadiene film which is permeated with high molecular weight linear polystyrene sulfonate. The styrene portions of the film are converted to an anion-exchange resin. The variables in this process were studied extensively. Very substantial interactions between variables were discovered. By combining the results of several local optimizations a substantially improved membrane was produced. Operating at a production rate of 6 to 7 GFD. Thus, piezodialysis is on the verge of being a practical desalting process. (See also W75-07622) (OWRT)
W75-07621

RESEARCH ON PIEZODIALYSIS - FIFTH REPORT,
Ionics, Inc., Watertown, Mass.
F. Leitz, J. Shorr, S. Spencer, and N. Denno.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-236 614, $4.75 in paper copy, $2.25 in microfiche. Report

INT-OSW-RDPR-74-989, December 1973. 73 p, 16 fig, 16 tab, 8 ref. OWRT Contract 14-01-0001-2333.

Descriptors: *Desalination, *Membrane process, Membranes, *Dialysis, *Electro-osmosis, Separation techniques, Reviews, *Waste water treatment, Mathematical models.
Identifiers: *Piezodialysis, *Mosaic membranes, Charge-mosaic membranes, Latex-polyelectrolyte membranes, Composite membranes, Salt flux.

A review of the piezodialysis program is presented. This shows the advantages and possible performance of the process and the rate of development of mosaic membranes appropriate for piezodialysis. The mathematical model developed for piezodialysis is summarized. The relationship of parameters in this model to the Kedem, Katchalsky, Weinstein and Caplan model for a parallel element mosaic is shown. A very simple approximate equation for permeate concentration is presented. An ambiguity in the meaning of optimum membrane performance is at least partially resolved. A further investigation was made of variables in the lates-polyelectrolyte method of mosaic method fabrication. In addition to providing relationships between fabrication variables and membrane performance, this investigation provided the first overall hypothesis of how membrane performance relates to membrane morphology. In addition a good deal of the ambiguity of earlier data was explained. A new route to a latex-polyelectrolyte membrane which avoids chloromethylation is evaluated. Significant advantages in the process of latex-polyelectrolyte optimization result from the much greater reproducibility and predictability of membrane properties in this new procedure. A closer look at membrane morphology was provided by a group of transmission electron micrographs. Clear structural differentiations were obtained between self-enriching and non-salt-enriching membranes. (See also W75-07621) (OWRT)
W75-07622

TUBULAR REVERSE OSMOSIS MEMBRANE RESEARCH,
Philco-Ford Corp., Newport Beach, Calif. Aeronutronic Div.
J. L. Richardson, R. H. Williams, G. Segovia, H. Parker-Jones, and F. Ju.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-236 943, $8.50 in paper copy, $2.25 in microfiche. Report INT-OSW-RDPR-74-993, (1974). 206 p, 75 fig, 63 tab, 25 ref, 3 append. OWRT Contract 14-30-2884.

Descriptors: *Reverse osmosis, *Desalination, *Membrane processes, *Ultrafiltration, *Pretreatment(Water), Sea water, Gels, Waste water treatment.
Identifiers: *Tubular membranes, Membrane fabrication, *Composite membranes, Porous polysulfone support, Crosslinking, Gelation.

A principal objectiv was the development of tubular NS-100 ultrathin composite membranes capable of demonstrating single-pass seawater desalination while contained within flexible braided pressure supports. An additional objective was to demonstrate the potential of ultrafiltration as pretreatment for the reverse osmosis desalination of seawater. Results are reported of the program which was organized into four tasks: Development of Improved Flexible Tubular Pressure Supports; Substrate Extrusion-Gelation; Advanced Tubular Composite Mebranes for Seawater Desalination; and Tubular Ultrafiltration Membranes for the Pretreatment of Seawater. (OWRT)
W75-07623

DEVELOPMENT OF IMPROVED PBI MEMBRANE SYSTEMS FOR WASH WATER RECYCLING AT PASTEURIZATION TEMPERATURES,
Celanese Research Co., Summit, N.J.
For primary bibliographic entry see Field 5D.
W75-07624

OPERATION AND EVALUATION OF ALUMINUM TUBED MSF-VTE-HTE PILOT PLANT AT WRIGHTSVILLE BEACH TEST FACILITY,
Reynolds Metals Co., Richmond, Va.
D. A. Fauth, R. I. Lindberg, and L. M. Coggins.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-235 835, $4.25 in paper copy, $2.25 in microfiche. Report INT-OSW-RDPR-74-986, March 1973. 36 p, 6 fig, 1 append, 2 charts. OWRT Contract 14-30-3057.

Descriptors: *Desalination plants, Desalination processes, Aluminum alloys, Distillation, Corrosion, *Flash distillation, *Evaporators, Heat transfer, *Pilot plants, *Operations, *North Carolina, Tubes, Treatment facilities, Waste water treatment, Scaling.
Identifiers: Detaclad aluminum steel, Remedial anti-pitting devices, Passivated film attack, Wrightsville Beach Test Facility(NC), MSF-VTE-HTE pilot plants.

Aluminum alloys were tested as heat transfer tubes and for vessel construction in a 54,000 gpd MSF-VTE-HTE, (multi-stage flash-rectical tube effect-horizontal tube effect), pilot plant utilizing two scale preventive pretreatments. The sulfuric acid treated portion of the plant operated at a 250F terminal temperature, and a threshold chemical treated portion operated at a 190F terminal temperature. The plant consisted of one all-aluminum evaporator-condenser, three combination steel-aluminum evaporator-condensers, two all-aluminum brine heaters, three all-aluminum vertical tube effects, one all-aluminum horizontal tube effect, and other components of aluminum. Alloy 3004 performed excellently for vessel construction and heat transfer tubing, and alloy 3003 performed excellently as heat transfer tubing. A slight amount of pitting occurred in the tubes in the heat reject vessel. Some exterior chemical attack occurred on the brine heater tubes. Both of these minor problems could easily be remedied. (OWRT)
W75-07625

DEVELOPMENT OF FORCED FLOW ELECTRODESALINATION SEPARATOR MATERIALS,
Aqua-Chem, Inc., Milwaukee, Wis.
R. M. Ahlgren, and B. Schneider.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-236 616, $4.25 in paper copy, $2.25 in microfiche. Report INT-OSW-RDPR-74-990, June 1974. 66 p, 11 photo, 12 graphs, append. OWRT Contract 14-30-3089.

Descriptors: *Desalination, *Electrodialysis, *Membranes, Fabrication, Waste water treatment, Separation techniques, Brackish water, Sea water.
Identifiers: *Thin-cell separators, Forced flow, *Elastomers, Electrodialysis stack, Silk screen technique, Cell pairs.

An improved concept of operating electrodialysis stacks with ultra-thin spacing between membranes has been developed. Thin separators (0.5 mm) utilize a formed-in-place elastomer gasket in a thin plastic mesh. A limited volume thin cell separator production method was developed. A demonstration stack utilizing about two thousand five hundred square feet of membrane (150 cell pair) was constructed. This stack was operated on simulated brackish water (3000 ppm) and seawater (35,000 ppm). Electrical power consumption was about one kilowatt hour per one thousand gallons per one thousand parts per million salt removed. The production capacity of the stack was over one hundred thousand gallons per day on brackish water and between five and ten thousand gallons per day on seawater. The estimated production cost of this type of electrodialysis separator is about one half of the cost of standard separators. (OWRT)
W75-07626

REVERSE OSMOSIS FOR SPACECRAFT WASH WATER RECYCLING, MEMBRANE COUPON AND MODULE EVALUATIONS,
McDonnell-Douglas Astronautics Co. West, Huntington Beach, Calif.
For primary bibliographic entry see Field 5D.
W75-07627

REVERSE OSMOSIS FOR SPACECRAFT WASH WATER RECYCLING, HIGH PRESSURE PUMP DEFINITION,
McDonnell Douglass Astronautics Co.-West, Huntington Beach, Calif.
For primary bibliographic entry see Field 8C.
W75-07628

MANAGEMENT, OPERATION AND MAINTENANCE BRACKISH WATER TEST FACILITY - ANNUAL REPORT 1973 ROSWELL, NEW MEXICO MAY 1, 1972 - OCTOBER 31, 1973,
Burns and Roe Construction Corp., Paramus, N.J.
A. R. Bernardi.
Available from the National Technical Information Service, Springfield, Val 22161, as PB-237 172, $5.75 in paper copy, $2.25 in microfiche. Report INT-OSW-RDPR-74-991, June 1974. 127 p, 27 fig, 8 tab. OWRT Contract 14-30-3012.

Descriptors: Equipment, *Operations, Management, Corrosion control, *Maintenance, Waste disposal, *New Mexico, Brackish water, *Desalination plants, Waste water treatment, *Treatment facilities.
Identifiers: Roswell Test Facility(NMex).

This report covers work performed at the Roswell Test Facility, Roswell, New Mexico, for the period May 1, 1972, through October 31, 1973. Work consisted of maintaining the Roswell Test Facility in the best and safest possible condition in accordance with the best established industrial practices and to provide the supporting effective development, test and evaluation program to advance the state of the art of water conversion. (OWRT)
W75-07629

APPRAISAL OF SALINE WATER IN OKLAHOMA AND ITS FUTURE DEVELOPMENT THROUGH DESALTING,
Oklahoma Water Resources Board, Oklahoma City.
F. Nelson.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-239 396, $7.00 in paper copy, $2.25 in microfiche. Report INT-OSW-RDPR-75-997, May 1974. 164 p, 47 fig, 7 tab, 40 ref. OWRT Contract 14-30-3176.

Descriptors: Desalination, *Desalination plants, *Water supply, *Electrodialysis, *Municipal water, Water costs, *Oklahoma, Planning, Brackish water, Brine disposal, Desalination processes, Waste water treatment.
Identifiers: Foss Reservoir plant(Okla).

Initially, a survey was made to identify communities using brackish water supplies in selected areas. Based on initial screening, 5 counties in North central Oklahoma and 11 counties in the southwest corner of the state were selected for further study. Water analyses on the supplies of these areas were brought up-to-date. Data on over a hundred of these communities is included in the Appendix. Extensive discussion of the 3 mgd electrodialysis plant at Foss Reservoir is given, including bid costs, water costs, pretreatment and brine disposal. It is concluded that most communities presently using brackish water can best meet their water problem through alternate fresh water

sources. However, it is further concluded that in the future, as the alternatives become more limited, there will be increasing need for desalting. Any immediate plans for desalting in the areas considered will await the results from the Foss Reservoir plant which is about to start operation. (OWRT)
W75-07630

ECONOMIC FEASIBILITY OF DESALTING SYSTEMS FOR MUNICIPAL WATER SUPPLY IN IOWA,
Dewild Grant Reckert and Associates, Des Moines, Iowa.
D. L. Laverentz.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-239 359, $9.25 in paper copy, $2.25 in microfiche. Report INT-OSW-RDPR-74-998, June 1974. 274 p, 59 fig, 100 tab, 93 ref. OWRT Contract 14-30-3120.

Descriptors: Desalination processes, Desalination plants, *Water supply, *Municipal water, Water costs, *Iowa, Brackish water, *Economic feasibility, Cities, Waste water treatment.

The economic feasibility of using desalting methods for improving water quality in Iowa communities was determined. Ten communities were chosen for the study: Adair, Estherville, Grundy Center, Holstein, Le Claire, Leon, Oakland, Oxford, Sibley and Washington. The population of the cities ranged from 666 to 6317. The salinity of the existing city water supplies ranged from 970 ppm to 2774 ppm. The cost analyses made for desalting included the complete system charges -- pretreatment, desalting plant, storage, transmission and brine disposal. The most applicable processes were electrodialysis, reverse osmosis, and ion exchange. Costs for the entire desalting system varied from 58 cents per 1000 gallons to 261 cents per 1000 gallons. Size of the community, salinity of the feed water and pretreatment required have effects on final cost of desalting. Calculations were also made of possible economic benefits that may be derived from desalting as compared to the use of the untreated brackish water source. (OWRT)
W75-07631

POSSIBLE OPTIONS FOR REDUCING THE SALINITY OF THE COLORADO RIVER WATERS FLOWING TO MEXICO (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Department of State, Washington, D.C.
Available from the National Technical Information Service, U.S. Dept. of Commerce, Springfield, Va. 22161, as EIS-NM-73-1516-F, $9.50 in paper copy, $2.25 in microfiche. September 26, 1973. 329 p, 12 tab, 41 map, 4 graph.

Descriptors: *Salinity, *Colorado River, *Mexican Water Treaty, *Desalination, Environmental effects, Rio Grande River, Deserts, Farms, Brines, Saline water, Construction, Brine disposal, Colorado River Basin, Seepage canals, Colorado, Mexico, Vegetation, Wildlife, Desalination processes, Desalination wastes, Water resources, Wastes, Weather modification.
Identifiers: *Environmental Impact Statements, International agreements.

Summarized are the anticipated environmental effects of a variety of proposed means of further reducing the salinity of the Colorado River waters being delivered to Mexico pursuant to the 1944 U.S.-Mexican Treaty for utilization of waters of the Colorado and Tijuana Rivers and of the Rio Grande. The environmental effects vary widely, depending upon the various options considered. The predicted adverse effects are primarily transitory and those normally associated with the period of construction and use of heavy construction equipment. Moderate amounts of desert, vegetation, farm lands and wildlife would be destroyed in the course of construction along the right of way. All of the desalting options have the inherent advantage of conserving scarce water resources in the area, but necessitate the taking of measures to dispose of the waste brine that is inevitably produced in the process. A favored possibility is to transport the brine along a 53 mile concrete land drain to the Santa Clara Slough. Alternatives considered include nine different desalting projects, relining canals to salvage water presently being lost through seepage, using weather modification techniques to augment available water resources, or placing a moratorium on all future federally supported development projects in the Colorado Basin. (Gagliardi-Florida)
W75-07782

HEAVY METALS REMOVAL BY THERMAL PROCESSES,
Princeton Univ., N.Y. Center for Environmental Studies.
For primary bibliographic entry see Field 5D.
W75-07798

METHOD OF STERILIZING REVERSE OSMOSIS WATER TREATMENT UNITS,
Culligan, Inc., Northbrook, Ill. (assignee).
For primary bibliographic entry see Field 5D.
W75-07806

3B. Water Yield Improvement

HYDROLOGIC IMPACT OF WATER MODIFICATION,
Agricultural Research Service, Chickasha, Okla.
E. H. Seely, and D. G. DeCoursey.
American Water Resources Bulletin, Vol 11, No 2, p 365-369, April 1975. 9 ref.

Descriptors: *Weather modification, Hydrology, *Rainfall, *Model studies, *Great Plains, *Risks, Agriculture, Agroclimatology, Water supply, Forecasting, Estimating.
Identifiers: *Hydrologic impact.

Weather modification is being proposed as a routine method of augmenting agricultural water supplies in the Southern Great Plains. Some of the potential hydrologic impacts of weather modification are discussed. Previous work in assessing hydrologic impact is reviewed; the conclusion is drawn that the work is insufficient. An approach based on hydrologic models, is suggested that can consider undertainties about the effect of weather modification on rainfall and some uncertainties about the effect of model error on impact conclusions. (ARS)
W75-07505

USE OF TIME-LAPSE PHOTOGRAPHY TO ASSESS POTENTIAL INTERCEPTION IN ARIZONA PONDEROSA PINE,
Arizona Univ., Tucson. Dept. of Watershed Management.
For primary bibliographic entry see Field 2C.
W75-07547

THE EFFECT OF MOISTURE DEFICIT ON CARBOHYDRATE METABOLISM OF DESERT PLANTS,
Akademiya Nauk Uzbekskoi SSR, Tashkent. Institut Botaniki.
For primary bibliographic entry see Field 2I.
W75-07602

WATERSHED MANAGEMENT IN ARIZONA'S MIXED CONIFER FORESTS: THE STATUS OF OUR KNOWLEDGE,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 4C.
W75-07648

RUNOFF AND EROSION AFTER BRUSH SUPPRESSION ON THE NATURAL DRAINAGE WATERSHEDS IN CENTRAL ARIZONA,
Arizona State Univ., Tempe.
P. A. Ingebo, and A. R. Hibbert.
U.S. Department of Agriculture, Forest Service, Research Note RM-275, 7 p, December, 1974. 2 fig, 2 tab, 5 ref.

Descriptors: *Chaparral, *Brush control, *Water yield improvement, *Erosion, *Watershed management, Brushlands, Streamflow, Sediment transport, Grasses, Shrubs, *Arizona, Southwest U.S., Arid lands, Range management, Runoff, Storm runoff, Surface runoff, Watersheds(Basins).

Brush cover on two small watersheds totaling 26 acres in central Arizona was chemically suppressed in 1954-1955. Annual streamflow subsequently increased 22% (0.36 area-inch), much less than on other treated chaparral watersheds. Most of the increase in streamflow occurred during the winter season. Annual sediment movement from the treated watersheds was reduced by and about 1 cu ft/acre. Grasses, forbs, and half-shrubs, which were not sprayed, increased after the chemical treatment. (Witt-IPC)
W75-07655

OPPORTUNITIES FOR INCREASING WATER YIELDS AND OTHER MULTIPLE USE VALUES ON PONDEROSA PINE FOREST LANDS,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
H. E. Brown, M. B. Baker, Jr., J. J. Rogers, W. P. Clary, and J. L. Kovner.
U.S. Department of Agriculture, Forest Service, Research Paper RM-129, 40 p, December, 1974. 23 fig, 11 tab, 69 ref.

Descriptors: *Water yield improvement, *Forest management, *Multiple purpose, *Ponderosa pine trees, Watershed management, *Arizona, Southwest U.S., Lumber, Water, Wildlife, Floods, Sedimentation, Water quality, Land management, Livestock, Grazing, Land clearing, Costs, Lumbering, Environmental effects, Coniferous forests, Recreation, Aesthetics, Model studies, Grasses, Pine trees, Lumbering.
Identifiers: Beaver Creek(Arizona).

Multiple use productivity is described for watershed lands in the ponderosa pine type of Arizona, with special emphasis on the Beaver Creek Pilot Watershed near Flagstaff. Yields of timber, herbage, and water under past management are reported, along with information on wildlife values, esthetics, flood and sedimentation hazards, and water quality. Changes in productivity and environmental quality are then described following five experimental land treatments including livestock grazing and various levels of forest thinning and clearing. Preliminary analytical procedures for predicting treatment responses and costs allow the user to estimate the tradeoffs in production and environmental quality. Some further research need for bringing these and other response models to operational capability is described. (Witt-IPC)
W75-07660

3C. Use Of Water Of Impaired Quality

SALT TOLERANCE IN THE WILD RELATIVES OF THE CULTIVATED TOMATO: WATER BALANCE AND ABSCISIC ACID IN LYCOPERSICON ESCULENTUM AND L. PERUVIANUM UNDER LOW AND HIGH SALINITY,
Negev Inst. for Arid Zone Research, Beersheba (Israel). Div. of Life Sciences.
M. Tal, and U. Gavish.
Australian Journal of Agricultural Research, Vol 24, No 3, p 353-361, May 1973. 5 tab, 2 fig, 16 ref.

Descriptors: *Salinity, *Transpiration, *Tomatoes, *Salt tolerance, Stress, Stomata, Osmotic pressure, Flow resistance, Adaptation, Saline water.
Identifiers: Abscisic acid.

Transpiration of whole plants and detached leaves, stomatal density and opening, and abscisic acid level were measured for the cultivated tomato and the more salt tolerant wild species grown under control and saline conditions. Transpiration was higher in the wild species, but decreased under more salinity. Wild plants had fewer stomata per unit leaf area, but these opened wider in the control and closed more in the saline solution as compared with the cultivated plants. Root resistance to water flow was higher in wild plants. The abscisic acid level was higher in the cultivated plants and increased in both plants under salinity. The results suggest that the higher osmotic pressure produced in the leaves of the wild plants grown in saline solution enables them to absorb more water from this solution. In addition, better stomatal control and a greater increase in mesophyll resistance to water flow under salinity appear to be significant in the superior adaptation of wild species to stress. (Mastic-Arizona)
W75-07364

EFFICIENT USE OF WATER - POLICY AND PROBLEMS,
Ministry of Agriculture, Tel-Aviv (Israel). Water Commission.
For primary bibliographic entry see Field 6D.
W75-07401

ISRAEL'S WATER ECONOMY AND ITS PROBLEMS IN THE EARLY SEVENTIES,
Tahal Consulting Engineers Ltd., Tel-Aviv (Israel). Long Range Planning Section.
For primary bibliographic entry see Field 6D.
W75-07402

AN EVALUATION OF THE USE OF WASTE HEAT FOR SOIL WARMING IN THE SOUTHEAST,
North Carolina State Univ., Raleigh. Dept. of Biological and Agricultural Engineering.
R. W. Skaggs, D. C. Sanders, and C. R. Willey.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-241 739, $5.25 in paper copy, $2.25 in microfiche. North Carolina Water Resources Research Institute, Raleigh, UNC-WRRI Report No 103, March 1975. 100 p, 34 fig, 28 tab, 30 ref, append. OWRT A-060-NC(1). 14-31-0001-4033.

Descriptors: *Heat transfer, Surface irrigation, Subsurface irrigation, Cooling water, *Heated water, *Soil temperature, *Southeast U.S., *Horticultural crops, *Mathematical models, North Carolina, Evaluation.
Identifiers: *Soil warming, Waste heat.

A field experiment was conducted to evaluate the use of waste heat for soil warming in the southeast. The water was heated to 100F (38C) and circulated through a network of one-inch diameter, 18 ft. long plastic pipes buried at a depth of 20 inches and spaced 20 inches apart. Soil temperature and heat flux measurements determined the effect of soil warming in combination with surface and subsurface irrigation on the soil temperature regime and on the amount of heat that can be transferred. The growth, development and yield of six horticultural crops were evaluated. Heat could be transferred to the soil system at rates ranging from 11.9 Btu/ft2 during hot periods to greater than 43.7 Btu/ft2 hr during cold periods. Heat transfer rates were increased 4 percent during summer months by subirrigation. Low volume sprinkler irrigation increased heat transfer rates by 16% and when both were used the heat transfer was increased 24%. During cool periods soil warming increased soil surface temperature by 9-12F and at the 8-inch depth by 15-20F. The mathematical model of Kendrick and Havens was used to project the heat flux measurements to prototype scale systems. A soil warming system of the type studied would require approximately 16,000 acres in the summer and 3,800 acres in the winter to handle the waste heat from a 1000 megawatt plant in North Carolina. The soil warming system will not now be economically competitive with conventational cooling methods in the Southeast. (Stewart-North Carolina State)
W75-07599

MINIMIZING THE SALT BURDENS OF IRRIGATION DRAINAGE WATERS,
Agricultural Research Service, Riverside, Calif. Salinity Lab.
For primary bibliographic entry see Field 5G.
W75-07620

LAND APPLICATION OF WASTEWATER AT COLORADO SPRINGS,
Colorado Springs Dept. of Public Utilities, Colo. Wastewater Div.
For primary bibliographic entry see Field 5G.
W75-07670

PLANT-WATER-USE EFFICIENCY WITH GROWTH REGULATORS AND TRANSPIRATION SUPPRESSANTS,
Delaware Univ., Newark. Dept. of Plant Science.
D. J. Fieldhouse.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-241 897, $3.25 in paper copy, $2.25 in microfiche. Completion Report, August 1972. 6 p, 3 ref. OWRT A-010-DEL(1). 14-01-0001-1627.

Descriptors: *Growth rates, *Transpiration, *Retardants, Irrigation, Tomatoes, Tobacco, Seed treatment, Fruit Germination, Mature growth stage, *Water utilization.
Identifiers: Pepper, Water stress, Transplants.

Water stress in plants may be minimized by the use of cultural practices that stimulate early growth, reduce water loss, restrict vegetative growth, control fruit set, and/or hasten maturity, thus reducing the need for irrigation. Tomato and pepper seeds germinated sooner and produced more rapid early growth when soaked in salt solutions at some time prior to planting. The response was not reduced by drying and storing the seeds for several months after treatment. Gibberellic acid at low concentrations on very young seedlings increased the rate of growth at below optimum temperatures. These treatments would speed up early growth so that young seedling would reach a more drought resistance stage sooner. A wax base transpiration suppressant was effective for reducing water loss from tomato, pepper, tobacco and sweet potato transplants. Applications could be made as a spray or as a plant dip. Proper selection of a surfactant was essential with the dip application. Alar (succinic acid 2,2-dimethyl hydrazide) and Ethrel (2-chloroethanephosphonic acid) were effective on tomatoes and peppers for reducing late vegetative growth and fruit set, thus, providing increased water-use efficiency.
W75-07724

EFFECTS OF BRACKISH IRRIGATION WATER AND FERTILIZERS ON MILLET AND CORN,
Hebrew Univ., Rehovoth (Israel).
S. Ravikovitch.
Exp Agric. Vol 9, No 2, p 181-188, 1973, Illus.

Descriptors: *Irrigation water, *Brackish water, Crop production, *Corn(Field), Millet, *Fertilizers, Nitrogen, Phosphorus.

Millet irrigated with water of EC (electrical conductivity) 3.30 mmho/cm produced yields 79-93% of the control (tap water of 0.61 mmho/cm), depending on the N and P treatment applied. With water of EC 5.05 mmho/cm yields equivalent to 52-72% were obtained. Corn yields were 78-90% of the control with irrigation water of 4.60 mmho/cm and 55-64% when irrigated with water of 7.06 mmho/cm. The N and P contents were mostly higher in plants grown on plots irrigated with brackish water.--Copyright 1973, Biological Abstracts, Inc.
W75-07754

WASTEWATER IRRIGATION: ITS LEGAL IMPACT,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Water Resources Research Center.
For primary bibliographic entry see Field 6E.
W75-07766

THE FEASIBILITY OF PENAEID SHRIMP CULTURE IN BRACKISH PONDS RECEIVING TREATED SEWAGE EFFLUENT,
North Carolina State Univ., Raleigh. Sea Grant Program.
W. L. Rickards.
UNC Sea Grant Reprint No. 58, (1974). 10 p. Reprinted from: Wastewater Use in the Production of Food and Fiber-Proceedings, 1974. U.S. Environmental Protection Agency, Environmental Protection Technology Series EPA-660/2-74-041, p 504-512. NOAA Grant OSG 2-35178.

Descriptors: *Aquiculture, *Aeration, *Shrimp, *Cultures, Environment, Sewage effluents, Brackish water, Impaired water quality, Aerobic treatment, Aerobic conditions, Oxygen, Oxygen requirements, Dissolved oxygen, Growth rates, Environmental effects, Size.
Identifiers: *Penaeid shrimp, *Treated sewage effluent ponds.

A study was conducted as an extension of a previous project where penaeid shrimp had been stocked in control and treated sewage ponds -- shrimp grew in control ponds but failed to survive in treated sewage ponds. It had been concluded in the earlier project that low levels of dissolved oxygen in the water at night and wide diurnal pH fluctuations were responsible for shrimp failure. The subsequent project was designed to modify oxygen and pH regimes in a sewage pond and subsequently stock it with shrimp to determine whether or not factors in addition to oxygen and/or pH had been responsible for the previous shrimp mortalities. Shrimp were able to survive and grow in the aerated sewage pond. New studies can proceed involving penaeid shrimp food chains utilizing treated domestic effluent and production dynamics in aquacultural applications. (NOAA)
W75-07830

3D. Conservation In Domestic and Municipal Use

THE CENTRAL ARIZONA PROJECT, A STAFF REPORT TO THE METROPOLITAN UTILITIES MANAGEMENT AGENCY BOARD AND THE MAYOR AND COUNCIL OF THE CITY OF TUCSON,
Tucson Metropolitan Utilities Management Agency Board, Ariz.
For primary bibliographic entry see Field 4B.
W75-07372

FIELD TRIP GUIDE BOOK FOR HYDROGEOLOGY OF THE TWIN CITIES ARTESIAN BASIN,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 4B.
W75-07573

EFFECTS OF THE MAY 5-6, 1973, STORM IN THE GREATER DENVER AREA, COLORADO,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 2E.
W75-07582

CHARACTERIZATION AND TREATMENT OF URBAN LAND RUNOFF,
North Carolina Water Resources Research Inst., Raleigh.
For primary bibliographic entry see Field 5D.
W75-07607

TEN COUNTIES INVESTIGATION: MUNICIPAL, INDUSTRIAL AND ARGICULTURAL WATER DEMAND IN COLUSA, GLENN, HUMBOLDT, LAKE, MARIN, MENDOCINO, NAPA, SOLANO, SONOMA, AND YOLO COUNTIES,
California State Dept. of Water Resources, Sacramento.
For primary bibliographic entry see Field 6D.
W75-07611

URBAN STORMWATER MANAGEMENT AND TECHNOLOGY: AN ASSESSMENT,
Metcalf and Eddy, Inc., Palo Alto, Calif.
For primary bibliographic entry see Field 5D.
W75-07692

3E. Conservation In Industry

METHODS OF COMMUNICATING ACTIVITIES IN POLLUTION ABATEMENT BY FIVE HUNDRED MAJOR INDUSTRIAL CORPORATIONS IN THE UNITED STATES,
Texas A and M Univ., College Station. Environmental Quality Program.
For primary bibliographic entry see Field 5G.
W75-07359

TEXAS WATERBORNE COMMERCE COMMODITY FLOW STATISTICS,
Texas Transportation Inst., College Station.
For primary bibliographic entry see Field 6B.
W75-07376

JAPAN: A SURVEY OF PORTS, DEEP WATER TERMINALS, AND VESSELS,
Army Engineer District, San Francisco, Calif. Economics Branch.
For primary bibliographic entry see Field 6C.
W75-07379

SOUTHWEST ENERGY STUDY. SUMMARY REPORT.
Southwest Energy Federal Task Force.
For primary bibliographic entry see Field 6B.
W75-07380

AN EVALUATION OF THE SUITABILITY OF ERTS DATA FOR THE PURPOSES OF PETROLEUM EXPLORATION,
Earth Satellite Corp., Washington, D.C.
For primary bibliographic entry see Field 7B.
W75-07488

AUTOMATED STRIP MINE AND RECLAMATION MAPPING FROM ERTS,
Ohio State Univ., Columbus.
For primary bibliographic entry see Field 7B.
W75-07491

MINERAL RESOURCES, GEOLOGICAL STRUCTURE, AND LANDFORM SURVEYS,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
For primary bibliographic entry see Field 7C.
W75-07500

FOSSIL FUELS AND POWER GENERATION IN THE COLORADO RIVER BASIN,
Brigham Young Univ., Provo, Utah. Dept. of Botany and Range Science.
K. T. Harper.
In: Environmental Management in the Colorado River Basin, October 15-16, 1973, Salt Lake City, Utah, Utah State University Press, Logan, 1974, p 164-173, 1 tab, 21 ref.

Descriptors: *Colorado River Basin, *Energy conversion, *Environmental effects, *Oil shales, Arizona, New Mexico, Utah, Colorado, Wyoming, Nevada, California, Strip mines, Fossil fuels, *Pollution abatement, Powerplants, Cost-benefit analysis.
Identifiers: Environmental management.

The Colorado River Basin has vast reserves of fossil fuels, particularly coal and oil shale. Energy needs nationwide and the cost of importing petroleum will force development of the basin's resources. Environmental impacts associated with coal fueled power generating plants will be diverse. Disruption can be exported in connection with mining, transportation, power generation, and power conveyance. The magnitude of any impact will depend upon the size of the industry, attention given impact mitigating practices and unforeseen technological advances. Studies are necessary if these energy resources are to be exploited in a manner compatible with the environment. Better methods of strip mining and of land rehabilitation must be found. More thought should be given to the economic and social change inherent in the eventual abandonment of the strip-mine-powerplant complexes. Finally, there is a real need for an accurate assessment of the actual cost of pollution controls now being forced on the power industry. These costs are probably more than consumers are actually willing to pay for the results derived. (See also W75-07525) (Bowden-Arizona)
W75-07537

POWER GENERATION AND THE COLORADO RIVER BASIN,
Utah Power and Light Co., Salt Lake City.
V. A. Finlayson.
In: Environmental Management in the Colorado River Basin, October 15-16, 1973, Salt Lake City, Utah, Utah State University Press, Logan, 1974, p 174-189, 3 fig, 3 tab, 21 ref.

Descriptors: *Colorado River Basin, *Energy conversion, *Geothermal studies, Water resources, *Water utilization, Arizona, Utah, New Mexico, Colorado, Wyoming, Nevada, California, Powerplants, Strip mines, Oil shales, Fossil fuels, Oil, Natural gas, Nuclear powerplants, *Long-term planning, Environmental effects.
Identifiers: Environmental management.

Utah Power and Light Company's projected energy needs and resources are outlined. The company is committed to finding fossil fuel substitutes. However, shortages of oil and natural gas and delays in the nuclear power program make coal the key fuel for at least the next decade. Particulates emitted by coal fired electric plants can be removed; it is questionable whether sulfur removal is worth the costs in energy and money. Water supply in the basin is adequate for energy development provided the states allocate water for such use. Alternative energy sources are assessed. Geothermal power may be on line in the 1980's, and nuclear plants are a definite alternative for that decade. Coal gasification, oil shale, and tar sands are all handicapped by large water needs. Solar energy conversion will not be commercially available until the year 2000. (See also W75-07525) (Bowden-Arizona)
W75-07538

TRANSPORTATION AND REGIONAL ENVIRONMENTAL MANAGEMENT,
Wyoming Univ., Laramie. Dept. of Economics; and Div. of Business and Economic Research.
For primary bibliographic entry see Field 6B.
W75-07539

A STUDY OF THE DYEING OF NYLON 6 WITH DISPERSE DYES FROM CHLORINATED HYDROCARBON SOLVENTS,
Auburn Univ., Ala. Dept. of Textile Engineering.
W. S. Perkins, and D. M. Hall.
Textile Research Journal, Vol 44, No 7, July 1974, p 528-531, 3 fig, 2 tab, 14 ref. OWRT A-033-ALA(1).

Descriptors: *Dyes, *Plastics, Solvents, Sorption, Solubility.
Identifiers: *Chlorinated hydrocarbons, *Dispersive dyes, Partition coefficients.

Dyeing of nylon 6 (polycaprolactam) film from trichlorethylene and perchloroethylene with several purified dyes is reported. Rate curves and diffusion data indicate that the sorption of disperse dyes by nylon from these solvents is slower by 50-100 times their sorption by polyester. Dyes with polar substituents give higher partition coefficients, probably due to their lower solubility in the solvents and higher solubility in nylon 6 than in very nonpolar dyes. Very few of the dyes studied have partition coefficients which would make exhaust dyeing desirable; however, the possibility of synthesizing dyes or finding dyes which would have application to nylon does appear to exist.
W75-07589

RECOVERY AND REUSE OF COAGULANTS FROM TREATMENT OF WATER AND WASTEWATER,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W75-07600

TEN COUNTIES INVESTIGATION: MUNICIPAL, INDUSTRIAL AND ARGICULTURAL WATER DEMAND IN COLUSA, GLENN, HUMBOLDT, LAKE, MARIN, MENDOCINO, NAPA, SOLANO, SONOMA, AND YOLO COUNTIES,
California State Dept. of Water Resources, Sacramento.
For primary bibliographic entry see Field 6D.
W75-07611

STUDY OF THE RELATION BETWEEN RESIDUAL SODA AND WATER-EXTRACTABLE COMPONENTS OF VACUUM DRUM WASHED KRAFT PULP AND OF REPULPED CORRUGATED CONTAINER EFFLUENT CHARACTERISTICS,
National Council of the Paper Industry for Air and Stream Improvement, Inc., New York.
For primary bibliographic entry see Field 5B.
W75-07634

MEMBRANE PROCESSES FOR FRACTIONATION AND CONCENTRATION OF SPENT SULFITE LIQUORS,
Institute of Paper Chemistry, Appleton, Wis.
For primary bibliographic entry see Field 5D.
W75-07638

PROSPECTS FOR THE APPLICATION OF REVERSE OSMOSIS IN THE PULP AND PAPER INDUSTRY (PERSPEKTIVY PUZITIA REVERZNEJ OSMOZY V CELULOZOPAPIERENSKOM PRIEMYSLE),
Vyskumny Ustav Papieru a Celulozy, Bratislava (Czechoslovakia).
For primary bibliographic entry see Field 5D.
W75-07639

GULF STATES (PAPER CORPORATIONS'S TUSCALOOSA, ALABAMA) NEW MULTI-HEARTH FURNACE WASTE TREATMENT SYSTEM,
Gulf States Paper Corp., Tuscaloosa, Ala.
For primary bibliographic entry see Field 5D.
W75-07641

ENVIRONMENTAL PROTECTION AND ECONOMIC ASPECTS OF INTERNAL WATER CIRCULATION SYSTEMS IN THE PULP AND PAPER INDUSTRY (UMWELTFREUNDLICHE UND WIRTSCHAFTLICHE ASPEKTE INNERER WASSERKREISLAUEFE IN DER PAPIER- UND ZELLSTOFF-INDUSTRIE),
For primary bibliographic entry see Field 5D.
W75-07643

PILOT SCALE TREATMENT OF WINE STILLAGE,
California State Dept. of Agriculture, San Francisco. Wine Advisory Board.
For primary bibliographic entry see Field 5D.
W75-07699

ULTRA PURE WATER PROCESS AND APPARATUS,
Aqua Media, Sunnyvale, Calif. (assignee).
For primary bibliographic entry see Field 5F.
W75-07810

CONDENSED WATER DECHLORINATION APPARATUS,
Hitachi Ltd., Tokyo (Japan). (assignee)
For primary bibliographic entry see Field 5D.
W75-07813

3F. Conservation In Agriculture

EFFECT OF DIFFERENT IRRIGATION PRACTICES ON THE GROWTH AND YIELD OF GRAPES (IN RUSSIAN),
A. I. Nasimov.
Uzb Biol Zh. Vol 17, No 1, p 17-19, 1973.

Descriptors: *Irrigation practices, *Plant growth, Fruit crops, Sprinkler irrigation, Soil-water-plant relationships, Furrow irrigation, Subsurface irrigation.
Identifiers: Grapevines.

Overhead sprinkling and subsoil irrigation increased the yield and quality of grapes and improved the growth and development of the plants. The 4-yr average yield (1967-1970) on 10-13-yr grapevines with subsoil irrigation was 174 cent/ha, with overhead sprinkling 131 cent/ha, and in the control (furrow irrigation) 103 cent/ha; on 3-6-yr grapevines the yield with subsoil irrigation was 187 cent/ha and in the control 122. The weight of the berries and clusters increased with overhead sprinkling. A more intense accumulation of sugar was noted with subsoil irrigation.--Copyright 1974, Biological Abstracts, Inc.
W75-07358

COMPETITIVE INTERACTION OF GRASSES WITH CONTRASTING TEMPERATURE RESPONSES AND WATER STRESS TOLERANCES,
University of New England, Armidale (Australia). Dept. of Agronomy.
W. Harris, and A. Lazenby.
Australian Journal of Agricultural Research, Vol 25, No 2, p 227-246, March 1974. 9 tab, 29 ref.

Descriptors: *Grasses, *Arid lands, *Drought tolerance, *Crop production, *Irrigated land, *Plant growth, Pastures, Stress, Competition.
Identifiers: Lolium perenne, Lolium perenne x multiflorum, Phalaris tuberosa, Festuca arundinacea, Paspalum dilatatum.

Grass species grown for two years in monoculture and two-species mixtures were studied under dryland and irrigated treatments. Competition effects were described with the use of diallel analysis and the aggressivities of the grass species were shown. Phalaris tuberosa in monoculture produced the highest yield under dryland conditions. Although appearing to assist survival of this species in mixture, marked dominance of Lolium perenne x multiflorum was detrimental in that it suppressed P. tuberosa, F. arundinacea, and P. dilatatum and thus restricted the potential of these species to produce in dryland conditions. This study confirmed the values of cool season growth and the high digestibility of the ryegrasses. However, the ability of P. tuberosa and F. arundinacea to grow and survive under conditions of water stress and overgrazing is of longer-term value to pastures of the region (Armidale, N.S.W.). Including only a small amount of ryegrass in seed mixtures would not only reduce the effects of ryegrass suppression, but would also reduce inter-ryegrass competition allowing development of larger ryegrass plants which may survive longer and contribute more to pasture production. (Mastic-Arizona)
W75-07363

HYDRAULIC DESIGN OF TWIN-CHAMBER TRICKLE IRRIGATION LATERALS,
Hawaii Univ., Honolulu. Dept. of Agricultural Engineering.
I-P. Wu, and D. D. Fangmeier.
University of Arizona, Tucson, Agricultural Experiment Station, Technical Bulletin 216. December 1974. 11 p, 14 fig, 7 ref.

Descriptors: *Trickle irrigation, *Hydraulic design, *Hydraulic models, *Irrigation engineering, Model studies, Computer programs, Tubes, Orifices, Orifice flow, Pressure.
Identifiers: Twin-chamber tubing, Single-chamber tubing.

Twin chamber tubing is a special tubing developed for trickle irrigation and consists of a main chamber and a secondary chamber. The ratio of numbers of orifices in the main to the secondary chamber controls the pressure differences between the two chambers. Water is discharged from orifices in the wall of the main chamber into the secondary chamber which discharges water for irrigation. The main advantages of twin-chamber tubing are that larger orifices can be used without increasing discharge and longer lengths of tubing can be used with a more uniform orifice discharge than with single-chamber tubing. The purposes of this study were to develop a simple model for computer simulation of twin-chamber tubing, and to develop design curves from the computed data. Hydraulic analysis of twin-chamber irrigation tubing was made by considering the main chamber to be the supply tube and the secondary chamber to be the distribution tube. By doing so, hydraulic analysis of a single chamber irrigation tube can be used to determine both pressure and discharge distribution along a twin-chamber irrigation tube. Development of design charts and procedures of engineering applications are described. (Mastic-Arizona)
W75-07365

PRODUCTIVITY OF VEGETABLE CROPS IN A REGION OF HIGH SOLAR INPUT, I. GROWTH AND DEVELOPMENT OF THE POTATO (SOLANUM TUBEROSUM L.), II. YIELDS AND EFFICIENCIES OF WATER USE AND ENERGY,
Commonwealth Scientific and Industrial Research Organization, Griffith (Australia). Div. of Irrigation Research.
P. J. M. Sale.
Australian Journal of Agricultural Research, Vol 24, No 5, p 733-749; 751-762, September 1973. 11 fig, 9 tab, 39 ref.

Descriptors: *Potatoes, *Solar radiation, *Crop production, *Irrigation, *Water utilization, *Irrigation effects, Plant growth, Photosynthesis.
Identifiers: Shading.

Details are given of yields and size gradings of three potato crops grown under conditions of high solar input, high temperature and varying irrigation treatments. The first part of this study describes the growth and development of the potato under three different levels of solar input and two levels of irrigation. The second part describes the final yields and efficiency of water use and energy by the potato crops under the different levels of treatment. Total yields were up to 50 t ha(-1). Differences resulting from different irrigation treatments were surprisingly small. Water use was about 300 g for each 1 g dry weight produced and efficiency was slightly greater in the wetter irrigation treatments. Reductions of 21 percent and 34 percent of the solar input markedly reduced yields. Tuber moisture percentage at harvest was not affected by irrigation treatment differences, but was reduced as shading increased. It is suggested that an increase in plant density and encouragement of early haulm growth may increase the yield by increasing the numbers of tubers which develop per unit area. (Mastic-Arizona)
W75-07366

PERFORMANCE OF BLUE GRAMA, SIDEOATS GRAMA, AND ALKALI SACATON ACCESSIONS UNDER IRRIGATION NEAR LAS CRUCES, NEW MEXICO,
New Mexico State Univ., University Park. Dept. of Agronomy.
F. A. Quinones.
Agricultural Experiment Station, New Mexico State University, Research Report No. 289, November 1974. 8 p, 7 tab, 3 ref.

Descriptors: *Irrigation, *Grama grasses, *New Mexico, *Plant growth, *Alkaline soils, *Crop production, Range management, Varieties, Agronomy, Seeds, Arid lands, Forage grasses, Germination, Adaptation.
Identifiers: Alkali sacaton, Alkaline soils, Seed production, Blue grama, Sideoats grama.

Blue grama, sideoats grama, and alkali sacaton are important grasses on the New Mexico rangelands. Blue grama and sideoats grama are warm season perennial grasses that are palatable to all livestock and maintain a high nutritive value. Alkali sacaton is also a warm season perennial grass that is relatively palatable and provides spring and summer grazing in alkaline areas. The yield and agronomic characteristics of various accessions of these grasses were evaluated in comparison with the cultivars or accessions commonly used for range reseedings. A test of four blue grama grass varieties shows the Lovington variety to be satisfactory in most traits, PMNM-118 was much the same, and did produce seed under unfavorable conditions when other strains yielded poorly. A sideoats grama test with four varieties showed the Vaughn to be a desirable cultivar, but PMNM-28 exhibited many favorable traits and should be evaluated further as a possible replacement for areas to which Vaughn is not adapted. The evaluation of alkali sacaton indicated A-920 to be a good forage producer; better methods or locations for producing seed should be investigated. The alkali sacaton accession PMC-14 was found to be desirable for use in mixtures for reseeding New Mexico ranges. (Mastic-Arizona)
W75-07367

THE EFFECT OF LEVEL OF WATER INTAKE ON SOME ASPECTS OF DIGESTION AND NITROGEN METABOLISM OF THE 'DESERT SHEEP' OF THE SUDAN,
Khartoum Univ. (Sudan). Faculty of Agriculture.
H. E. Osman, and B. Fadlalla.
Journal of Agricultural Science, Cambridge, Vol 82, part 1, p 61-69, February 1974. 10 tab, 24 ref.

Descriptors: *Water consumption, *Water requirements, *Digestion, *Grazing, *Arid lands, *Sheep, Hay, Water shortage, Proteins, Nitrogen, Dry seasons, Metabolism.
Identifiers: *Sudan desert sheep, Organic matter.

Five trials were conducted on eight adult rams (Sudan desert sheep) to study the effect of water intake restriction on some aspects of digestion and nitrogen metabolism. Feeds used were berseem hay (Medicago sativa), lubia hay (Dolichos lablab), maize hay (Zea mais), a concentrate mixture, and a mixture of desert grasses. Restriction of water did not affect digestibility of organic matter, crude protein, or crude fiber significantly. Increases in rumen ammonia and blood urea nitrogen concentration were reduced by water restriction except when the desert grasses were fed. Restriction of water intake also slightly increased the rate of fermentation of rumen contents which is taken as a measure of microbial activity in the rumen, and retention of nitrogen. The results are interpreted as indicative of more efficient nitrogen utilization under water restriction conditions. To understand the nutritional status of the Sudan desert sheep it is necessary to study the levels of feed intake, water consumption, and grazing habits during the dry season. This will help in assessing the effect of a drinking water shortage on the protein metabolism of desert sheep. (Mastic-Arizona)
W75-07373

PREHISTORIC SOIL AND WATER CONTROL IN THE AMERICAN SOUTHWEST: A CASE STUDY,
Northern Arizona Univ., Flagstaff. Dept. of Anthropology.
D. Brooks.
M.A. Thesis, May 1974. 59 p, 9 fig, 5 tab, 2 plates, 33 ref.

Descriptors: *Utah, *Arid lands, *Dams, *Agriculture, *Irrigation systems, *Soil-water-plant relationships, Corn(Field), Runoff, Soil moisture, *Southwest U.S.
Identifiers: Prehistoric Agriculture, Indians(American).

Although prehistoric water control systems have long been noted in the American Southwest, scholars have displayed little interest in how the systems actually worked. One type of system, check dams, on Horse Flats, a high plateau on the western periphery of Elk Ridge in southeastern Utah, is described. At an elevation of 8,000 feet, the area seems uninviting for agriculture, particularly corn. Yet thirty surviving check dams indicate that the Flats were cropped. Several tentative conclusions about how the system worked are offered. The dams were filled by natural sedimentation, not human transport. Evidence suggests that the system grew from lower dams upward. Corn seems to have been the main crop. The site seems to have been exploited between 1000 A.D. and 1300 A.D. It remains to be discovered just how productive such techniques are in utilizing runoff for agriculture. (Bowden-Arizona)
W75-07375

EFFECTS OF SURFACE MOISTURE SUPPLY ON THE SUBSOIL NUTRITIONAL REQUIREMENTS OF LUCERNE (MEDICAGO SATIVA L.),
Commonwealth Scientific and Industrial Research Organization, Canberra (Australia). Div. of Plant Industry.
For primary bibliographic entry see Field 2G.
W75-07393

WILDLIFE, ECOLOGY, AND PLANNING IN A PROPOSED IRRIGATION DEVELOPMENT IN NORTH DAKOTA,
North Dakota State Univ., Fargo.
For primary bibliographic entry see Field 6G.
W75-07400

THE EFFECT OF YOUNG FIELD SHELTERBELTS ON THE ELEMENTS OF MICROCLIMATE AND ON THE YIELD OF AGRICULTURAL CROPS,
E. V. Antonov.
Tr Kaz Nauchno-Issled Inst Lesn Khoz. 7. p 109-114, 1970.

Descriptors: *Shelterbelts, *Agronomic crops, *Soil-water-plant relationships, Corn, Environmental effects, Microclimatology, Wheat, Snow cover, Wind velocity, Chernozems, Grasslands.
Identifiers: Betula-verrucosa, Populus-balsamifera, USSR, Poplars, Steppes.

The investigations were conducted on the permanent study areas for the improvement of agriculture by forestry measures in the State farms of the Kokchetav Region (USSR) on ordinary and southern heavy loamy slightly solonetzic chernozems, where field shelterbelts (FSB) were established with the spacing of planting places of 1.0-1.5 x 1.5-3.0 m. The main tree species were Populus balsamifera and Betula verrucosa. The effect of 3-4-yr-old strips on the reduction of wind velocity and on the snow distribution is felt at a distance 25-30 times the strip heights, whereas the effect of the 5-6-yr-old ones, as regards the increase of density, is felt at a distance 15-20 times the strip heights. Under the protection of 3-yr-old FSB of poplar, the yield of the corn herbage in the zone up to 70 m from the stands was 1500-8100 kg/ha higher than in the open steppe. Under the effect of the 4-yr-old FSB of poplar, increase of yield of the 'Lyutestsens 167' spring wheat was observed up to a distance of 15-25 heights. On the whole, the yield increment due to FSB, in comparison with the open steppe, is 50-450 kg/ha in cereals, and 1500-8100 kg/ha in corn. Indexes are presented of the effect of FSB on the reduction of wind velocity, on evaporation from the open water surface, on air temperature and on distribution of snow.--Copyright 1974, Biological Abstracts, Inc.
W75-07408

A CALCULATION OF SUMMARY EVAPORATION OF AN OBSERVATION OF AN IRRIGATION REGIME OF SALINE SOILS,
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gidrotekhniki i Melioratsii, Moscow (USSR).
For primary bibliographic entry see Field 2D.
W75-07415

ALKALOID CONTENT OF ROEMERIA REFRACTA (IN RUSSIAN),
Akademiya Nauk Uzbekskoi SSR, Tashkent. Institut Botaniki.
For primary bibliographic entry see Field 2I.
W75-07454

AGRICULTURE, FORESTRY, RANGE RESOURCES,
National Aeronautics and Space Administration, Houston, Tex., Lyndon B. Johnson Space Center.
For primary bibliographic entry see Field 7C.
W75-07493

AGRICULTURE, FORESTRY, RANGE RESOURCES,
National Aeronautics and Space Administration, Houston, Tex., Lyndon B. Johnson Space Center.
For primary bibliographic entry see Field 7C.
W75-07498

WATER QUALITY IN EASTERN OREGON,
Oregon State Univ., Corvallis. Dept. of Soil Science.
For primary bibliographic entry see Field 5B.
W75-07517

SEASONAL TRENDS AND VARIABILITY OF SOIL MOISTURE UNDER TEMPERATE PASTURE ON THE NORTHERN TABLELANDS OF NEW SOUTH WALES (AUSTRALIA),
University of New England, Armidale (Australia). Dept. of Agronomy and Soil Science.
For primary bibliographic entry see Field 2G.
W75-07520

AN EXAMINATION OF THE ENVIRONMENTAL CARRYING CAPACITY CONCEPT FOR THE AGRICULTURAL SECTOR OF THE COLORADO RIVER BASIN,
New Mexico State Univ., University Park.
G. W. Thomas.
In: Environmental Management in the Colorado River Basin, October 15-16, 1973, Salt Lake City, Utah, State University Press, Logan, 1974, p 119-148, 6 fig, 2 tab, 32 ref.

Descriptors: *Colorado River Basin, *Carrying capacity, *Environmental effects, *Agriculture, Arizona, New Mexico, Colorado, Utah, Wyoming, Nevada, California, Air pollution, Water pollution, *Long-term planning, Farm wastes, Fertilizers, Productivity, Fossil fuels.
Identifiers: Environmental management.

The resource base will limit man's ability to supply food and fiber to an ever increasing population. While the capacity of the environment for absorbing pollution will also intervene, the finite nature of resources will prove more important. Population control is essential in all countries. To feed the world in the year 2000, it will be necessary to double yields, increase acreage by at least 50 percent, introduce exotic foods such as insects, and destroy much wildlife and recreational lands. Innovations in crops and farming technology tend to reduce the land and water requirements per capita but require large energy subsidies. Organic farming, if practiced on a wide scale, will increase per capita land and water requirements because acre yields will drop. A vegetarian diet requires less land than a diet dependent on meat products, because humans move closer to the producers in the food chains. The substitution in recent decades of many foods for cereals and potatoes has increased per capita land and water requirements. Use of processed foods in the United States has increased pressure on land and water resources. The Colorado River Basin is rich in agricultural resources with water and fossil fuels as the major limiting factors in the region's carrying capacity. Growing populations will put more pressure on the region necessitating the forging of new energy technologies and better knowledge of the region's ecosystems. (See also W75-07525) (Bowden-Arizona)
W75-07535

AGRICULTURE'S MANAGEMENT OF THE ENVIRONMENT IN THE COLORADO RIVER BASIN,
American Farm Bureau Federation, Salt Lake City, Utah. Natural Resources Dept.
L. H. Johnson.
In: Environmental Management in the Colorado River Basin, October 15-16, 1973, Salt Lake City, Utah, Utah State University Press, 1974. p 149-162, 27 ref.

Descriptors: *Colorado River Basin, *Agriculture, *Droughts, *Water allocation(Policy), *Irrigation, Arizona, New Mexico, Utah, Colorado, Wyoming, Nevada, California, Flood damage, Erosion control, Salinity, Legal aspects.
Identifiers: Environmental management.

Agricultural efforts to manage the environment in the Colorado Basin constitute activities to manage six enemies: flood, drought, erosion, fire, disease and insects. The conservation of water resources in order to protect topsoils, stop floods, and mitigate droughts is perhaps agriculture's most distinguished accomplishment in the basin. Untamed rivers are truly wild, and periodically, such streams kill and destroy. Today, the basin holds

millions of acres suitable for agriculture which lie fallow because of water shortages. Many studies are necessary if the basin is to be properly managed in the future. More must be learned about water management's impact on wildlife. The salinity problem must be solved. Phraetophyte effect on the available water supply must be understood. Also, studies on the best exploitation of rangelands and on Indian water claims should be pursued. Agriculture is important to the basin and important to a hungry world. Thus, the National Water Commission's recommendation that the amount of irrigated land be reduced in the basin is open to serious question. (See also W75-07525) (Bowden-Arizona)
W75-07536

FATE OF INSECTICIDES IN AN IRRIGATED FIELD; AZINPHOSMETHYL AND TETRADIFON CASES,
Agricultural Research Organization, Bet-Dagan (Israel). Inst. of Soils and Water.
For primary bibliographic entry see Field 5B.
W75-07548

THE COMPARED BIOLOGY OF CERCOSPORIOSIS AND HELMINTHOSPORIOSIS IN GUINEA GRASS (PANICUM MAXIMUM), (IN FRENCH),
Centre de Recherches Agronomiques des Antilles et de la Guyane, Petit Bourg (Guadeloupe).
For primary bibliographic entry see Field 2I.
W75-07552

THE EFFECT OF SLAKED-LIME AND STRAW ON THE SOIL PH IN THE FLOODED AND UPLAND CONDITION (IN KOREAN),
Office of Rural Development, Suwon (Republic of Korea). Crop Experiment Station.
For primary bibliographic entry see Field 2G.
W75-07645

MULCHING EFFECTS BY HOLEY SHEET TO DIRECT SOWING CULTURE OF PADDY RICE ON DRAINED LOWLAND RICE FIELD: I. CHECKING EFFECTS OF MULCHING ON WATER LEAKAGE, ROOT DISTRIBUTION, GROWTH AND YIELD OF PADDY RICE PLANT, (IN JAPANESE),
Tokyo Univ. of Agriculture and Technology (Japan). Experimental Farm.
S. Kawashima, and T. Tanabe.
J Agric Sci Tokyo Nogyo Daigaku. Vol 17, No 1, p 73-80. 1972, Illus, English summary.

Descriptors: *Mulching, *Rice, Plastics, *Crop production, Root distribution, Soil water.
Identifiers: Black vinyl, Holey sheet.

Mulching with a holey sheet, black vinyl, saved half of the leakage water as compared to that of the control plot. It also resulted in vigorous growth and higher yield where soil temperature was high and evaporation from the soil surface was controlled. However, soil water below the sheet was stagnated, and root distribution was abnormal.--Copyright 1973, Biological Abstracts, Inc.
W75-07748

EFFECT OF RAINFALL DISTRIBUTION ON YIELD OF GROUNDNUT (ARACHIS HYPOGAEA L.) IN SAURASHTRA,
College of Agriculture, Junagadh (India). Main Oilseeds Research Station.
S. N. Joshi, and M. M. Kabaria.
Indian J Agric Sci. Vol 42, No 8, p 681-684, 1972.

Descriptors: *Peanuts, Distribution patterns, Crop production.
Identifiers: *India.

A study made during 1945-1970 at Amreli, India, revealed that neither the total rainfall nor the number of rainy days had any relationship with yield. In 30% of the total experimental period no rainfall was received during the growth period of 51-65 days of the crop, and there was no rain in nearly 50% of the total period during 66-80 days of the crop growth. In general, only once in 3 yr was the distribution of rainfall favorable for bunch groundnut in Saurashtra. Rainfall from the full pegging to the pod development (51-80 days) stage significantly correlated with yield. The most critical period was the week from full pegging to early pod development (51-57 days). A decrease in 1 mm rainfall during this week reduced the yield by 3.27 kg/ha.--Copyright 1973, Biological Abstracts, Inc.
W75-07753

MICROBIOLOGICAL AND ENZYMIC ACTIVITY OF IRRIGATED AND FERTILIZED SOIL (IN RUSSIAN),
Khersonskii Selskokhozyaistvennyi Institut (USSR).
K. F. Kiver.
Mikrobiol Zh (KYYIV). Vol 35, No 2, p 149-153, 1973, English summary.

Descriptors: *Irrigation practices, Irrigation efficiency, *Fertilization, Timing, Farm management, Fertilizers, Organic matter, Soil moisture, *Soil management, Microorganisms, Rhizosphere, Soil microorganisms.
Identifiers: Enzymic, Fertilization, Irrigation, Microbiological, Microorganisms, Soil, Tomato, Under.

Autumn irrigation during the vegetation period in combination with application of organic fertilizers improves moisture conditions and the nutrient regime of the soil and increases the total amount of microorganisms. The microbiological and enzymic processes are most intensive in rhizosphere soil. With improved biological activity of soil yield of tomatoes increased.--Copyright 1974, Biological Abstracts, Inc.
W75-07764

PORTABLE PEDESTAL MOUNTED TOWER IRRIGATOR,
Alco Standard Corp., Valley Forge, Pa. (assignee)
S. D. Newell.
U.S. Patent No. 3,870,235, 6 p, 25 fig, 12 ref; Official Gazette of the United States Patent Office, Vol 932, No 2, p 516, March 11, 1975.

Descriptors: *Patents, *Irrigation systems, *Water distribution(Applied), Equipment, Conservation, Agriculture, Conveyance structures.

A portable, rotatable, pedestal or column supported irrigating or liquid dispensing apparatus has a pair of oppositely balanced, cable tensioned and supported, horizontally extending, truss arm spray assemblies. They are mounted on a support base which is carried by a wheeled truck or car. The car is adapted to be moved from one operating location to another as required after an overlapping spray pattern has been effected at one area. The lower part of the construction includes a connector pipe that is mounted within a triangular-shaped lower support frame and provided with coupling means for connection to fluid inlet piping. A pipe extends centrally vertically upward from the lower pipe along and within the lower support frame and an upper rotatable support frame. The upper pipe is rotatably carried and driven and serves as a through-extending support for the upper frame and its truss assemblies. (Sinha-OEIS)
W75-07822

4. WATER QUANTITY MANAGEMENT AND CONTROL

4A. Control Of Water On The Surface

INFLUENCES OF WASTEWATER MANAGEMENT ON LAND USE: TAHOE BASIN 1950-1972,
California Univ., Santa Cruz.
For primary bibliographic entry see Field 5D.
W75-07362

PREHISTORIC SOIL AND WATER CONTROL IN THE AMERICAN SOUTHWEST: A CASE STUDY,
Northern Arizona Univ., Flagstaff. Dept. of Anthropology.
For primary bibliographic entry see Field 3F.
W75-07375

WATER RIGHTS,
Wisconsin Univ., Madison. School of Law.
For primary bibliographic entry see Field 6E.
W75-07378

WATER SUPPLY AND WASTEWATER DISPOSAL IN RURAL AREAS OF INDIA,
Greenleaf/Telesca, Miami, Fla. Environmental Sciences Dept.
D. S. Airan.
Water Resources Bulletin, Vol 9, No 5, p 1035-1040, October 1973. 14 ref.

Descriptors: *Water supply, *Waste water disposal, *Environmental sanitation, *Rural areas, Human population, Planning, Projects, Public utilities, Public health, Design standards.
Identifiers: *India, *Environmental hygiene, Developing countries, Urban centers, Case study, Beri(India), Economic aspects.

Piped water supply and sewerage have been taken almost for granted in developed countries. The provision of safe water supplies and sanitary disposal of wastes is extremely important for sound health and balanced progress of any society. However, less than one tenth of the population in developing countries enjoy these facilities at present. This paper reviews the importance, background and current status of water and wastewater facilities in India. The relative situation in urban centers and in rural areas, conventional practices in environmental hygiene, the programs for improvement, and the problems involved with possible solutions are discussed. Problems such as population, poverty, and uneven rainfall distribution combine to stall any progress in India. About three-fourths of the total population lives in rural areas where there are no good roads, safe water supplies, or dependable waste disposal arrangements; moreover, some rural areas do not even have electric power. In the cities, migrations are causing an increasing population growth rate, so that public health utilities such as hospitals and water supply systems fall short of requirements soon after they are installed. The main problem in planning such utilities is financing. Mutual cooperation between residents, local administration, and state government is recommended. Despite aid from various international organizations since 1947, India has a long way to go before satisfactory standards are attained. (Bell-Cornell)
W75-07381

LINEAR DECISION RULE IN RESERVOIR MANAGEMENT AND DESIGN, 4. A RULE THAT MINIMIZES OUTPUT VARIANCE,
Johns Hopkins Univ., Baltimore, Md. Dept. of Geography and Environmental Engineering.
C. ReVelle, and J. Gundelach.

Water Resources Research, Vol 11, No 2, p 197-203, April 1975. 2 tab, 31 equ, 4 ref.

Descriptors: *Reservoir operation, *Design, *Linear programming, *Reservoir releases, Constraints, Management, Reservoir storage, Costs, Equations, Mathematical models, Systems analysis.
Identifiers: *Output variance, Historical data, Minimization, Reservoir capacity.

A linear decision rule (LDR) in reservoir management and design is reviewed and then transformed. A generalized formulation of a new LDR is presented, and the necessary steps to implement it are carried out for a particular form of the new rule. The proposed rule permits further minimization of expected losses arising from deviations of releases from prespecified target levels. The use of the rule also makes possible a larger minimum commitment of water. The problem is solved for historical data from the Gunpowder River in Maryland under both the previous and the new form of the LDR. Results obtained are compared for the two cases. The new form of the LDR allows a higher minimum release level than the maximum possible under the previous rule. In comparison of the original rule and the new rule with the same minimum flow constraints, the minimum size reservoir under the new rule is 16.3% greater than the one required with the previous LDR. This difference is compensated for by a 23.2% decrease in the variance of the average release. (See also W75-07384) (Bell-Cornell)
W75-07383

LINEAR DECISION RULE IN RESERVOIR MANAGEMENT AND DESIGN, 5. A GENERAL ALGORITHM,
Johns Hopkins Univ., Baltimore, Md. Dept. of Geography and Environmental Engineering.
J. Gundelach, and C. ReVelle.
Water Resources Research, Vol 11, No 2, p 204-207, April 1975. 4 tab, 4 equ, 3 ref.

Descriptors: *Reservoir operation, *Design, *Linear programming, Algorithms, Constraints, Reservoir storage, Reservoir releases, Management, Equations, Mathematical models, Systems analysis.
Identifiers: Chance-constrained programming, Capacity, Decision constants.

For the chance-constrained reservoir model introduced by ReVelle et al. (1969), a rapid algorithm is derived that determines the capacity and decision constants for a reservoir to be operated by use of the linear decision rule. The new algorithm supplants the earlier technique, which was fitted to a specialized problem format. The solution is achieved without resorting to the usual linear programming solution techniques, and the algorithm is simple enough to be carried out merely by hand computation. The chance-constrained reservoir model seeks the smallest reservoir that satisfies constraints on freeboard, minimum storage, and minimum release. The new algorithm will serve for any feasible formulation of a reservoir operating by the linear rule. (See also W75-07383) (Bell-Cornell)
W75-07384

DECISION ANALYSIS FOR THE RIVER WALK EXPANSION IN SAN ANTONIO, TEXAS,
Texas Univ., San Antonio. Dept. of Environmental Studies.
For primary bibliographic entry see Field 6B.
W75-07387

A SCREENING MODEL FOR WATER RESOURCES PLANNING,
Nebraska Univ., Lincoln. Water Resources Research Inst.
For primary bibliographic entry see Field 6A.
W75-07388

PIMA COUNTY MOVES ON GEOLOGIC HAZARDS,
Arizona Bureau of Mines, Tucson.
For primary bibliographic entry see Field 6F.
W75-07392

FLOW PATTERNS OF RAINWATER THROUGH SLOPING SOIL SURFACE LAYERS AND THE MOVEMENT OF NUTRIENTS BY RUNOFF,
Iowa State Univ., Ames. Dept. of Agronomy.
For primary bibliographic entry see Field 5B.
W75-07395

AQUATIC PLANT HARVESTING: DEVELOPMENT OF HIGH-SPEED HARVESTERS AND PROCESSING AND UTILIZATION OF HARVESTED VEGETATION,
Wisconsin Univ., Madison. Dept. of Agricultural Engineering; and Wisconsin Univ., Madison. Dept. of Mechanical Engineering.
D. F. Livermore, R. G. Koegel, H. D. Bruhn, S. H. Sy, and H. F. Link.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-241 715, $4.25 in paper copy, $2.25 in microfiche. Wisconsin Water Resources Center, Madison, Technical Report WIS WRC 75-02, March 1975. 47 p, 16 fig, 8 tab, 15 ref, append. OWRT B-078-WIS(2) and GI 39193 (NSF/RANN). 14-31-0001-3947 and GI 39193.

Descriptors: *Wisconsin, *Aquatic weed control, *Aquatic vegetation, *Rooted aquatic plants, *Water harvesting, *Productivity, Costs, Mulching, *Mechanical equipment, Treatment, Feeds.
Identifiers: Dane County(Wisc).

Research was conducted to reduce the cost of aquatic plant harvesting by increasing harvester productivity through high-speed harvesting, by reducing the handling costs of the harvested vegetation, and/or by improving the potential for economic utilization of the vegetation. Also described are the design, construction, and testing of a craft for concentrating and collecting pre-cut, floating aquatic vegetation at speeds several times those of conventional harvesters. Recommendations are made for increasing the mechanical efficiency of this machine. A moisture prediction function was developed for aquatic vegetation subjected to pressure. Presented are data on the chemical constituents of the vegetation which were compared to conventional forage materials. Possible uses of the cut vegetation are enumerated.
W75-07397

WILDLIFE, ECOLOGY, AND PLANNING IN A PROPOSED IRRIGATION DEVELOPMENT IN NORTH DAKOTA,
North Dakota State Univ., Fargo.
For primary bibliographic entry see Field 6G.
W75-07400

NONSTATIONARY MODEL OF THE TRANSFORMATION OF EFFECTIVE PRECIPITATION INTO RUNOFF,
For primary bibliographic entry see Field 2A.
W75-07437

STREAM GAGING INFORMATION, AUSTRALIA -- SUPPLEMENT 1973.
Australian Water Resources Council, Canberra.
For primary bibliographic entry see Field 7C.
W75-07480

GEOLOGIC EVALUATION AND APPLICATIONS OF ERTS-1 IMAGERY OVER GEORGIA,
Georgia State Geological Survey, Atlanta.
For primary bibliographic entry see Field 7B.
W75-07487

ERTS PROGRAM OF THE U.S. ARMY CORPS OF ENGINEERS,
Corps of Engineers, Washington, D.C.
For primary bibliographic entry see Field 7C.
W75-07489

AGRICULTURE, FORESTRY, RANGE RESOURCES,
National Aeronautics and Space Administration, Houston, Tex., Lyndon B. Johnson Space Center.
For primary bibliographic entry see Field 7C.
W75-07493

LAND USE AND MAPPING,
National Aeronautics and Space Administration, Bay Saint Louis, Miss., Earth Resources Lab.
For primary bibliographic entry see Field 7B.
W75-07495

MINERAL RESOURCES, GEOLOGICAL STRUCTURES, AND LANDFORM SURVEYS,
National Aeronautics and Space Administration, Greenbelt, Md., Goddard Space Flight Center.
For primary bibliographic entry see Field 7B.
W75-07496

THIRD EARTH RESOURCES TECHNOLOGY SATELLITE SYMPOSIUM, VOLUME III, DISCIPLINE SUMMARY REPORTS,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
For primary bibliographic entry see Field 7C.
W75-07497

AGRICULTURE, FORESTRY, RANGE RESOURCES,
National Aeronautics and Space Administration, Houston, Tex., Lyndon B. Johnson Space Center.
For primary bibliographic entry see Field 7C.
W75-07498

LAND USE AND MAPPING,
National Aeronautics and Space Administration, Bay, Saint Louis, Miss. Earth Resources Lab.
For primary bibliographic entry see Field 7B.
W75-07499

WATER RESOURCES,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
For primary bibliographic entry see Field 7B.
W75-07501

INTERPRETATION TECHNIQUES,
National Aeronautics and Space Administration, Houston, Tex. Lyndon B. Johnson Space Center.
For primary bibliographic entry see Field 7C.
W75-07504

LAND AND WATER USE IN OREGON,
Oregon State Univ., Corvallis. Water Resources Research Inst.
For primary bibliographic entry see Field 6B.
W75-07507

COMPUTER SIMULATION OF LAND USE DYNAMICS,
Oregon State Univ., Corvallis. Willamette Simulation Unit.
For primary bibliographic entry see Field 6A.
W75-07509

EVOLVING PATTERNS OF FLOOD PLAIN USE,
Oregon State Univ., Corvallis. Dept. of Geography.
For primary bibliographic entry see Field 6F.
W75-07510

ADJUDICATION IN LAND-WATER DISPUTES,
Oregon Div. of State Lands, Salem.
For primary bibliographic entry see Field 6E.
W75-07511

CONSUMER PROTECTION AND LAND USE,
Oregon Real Estate Div., Salem.
For primary bibliographic entry see Field 6B.
W75-07512

ECONOMIC ANALYSIS OF FLOOD DETENTION STORAGE BY DIGITAL COMPUTER,
Kentucky Water Resources Inst., Lexington.
For primary bibliographic entry see Field 6F.
W75-07518

SEASONAL TRENDS AND VARIABILITY OF SOIL MOISTURE UNDER TEMPERATE PASTURE ON THE NORTHERN TABLELANDS OF NEW SOUTH WALES (AUSTRALIA),
University of New England, Armidale (Australia). Dept. of Agronomy and Soil Science.
For primary bibliographic entry see Field 2G.
W75-07520

NUMERICAL ANALYSIS OF VERTICAL WATER MOVEMENT IN A BOUNDED PROFILE,
New South Wales Univ., Kensington (Australia). School of Civil Engineering.
For primary bibliographic entry see Field 2G.
W75-07521

ENVIRONMENTAL MANAGEMENT IN THE COLORADO RIVER BASIN.
For primary bibliographic entry see Field 6B.
W75-07525

BASIN-WIDE PLANNING AND THE PROBLEM OF MULTIPLE JURISDICTIONS,
Ferris, Weatherford and Brennan, San Diego, Calif.
For primary bibliographic entry see Field 6E.
W75-07526

MANAGEMENT OBJECTIVES IN THE COLORADO RIVER BASIN: THE PROBLEM OF ESTABLISHING PRIORITIES AND ACHIEVING COORDINATION,
Bureau of Reclamation, Salt Lake City, Utah. Upper Colorado Region.
For primary bibliographic entry see Field 6B.
W75-07527

THE ROLE OF ENVIRONMENTAL INDICES IN REGIONAL MANAGEMENT,
Resources for the Future, Inc., Washington, D.C.
For primary bibliographic entry see Field 6B.
W75-07528

ENVIRONMENTAL CARRYING CAPACITY: AN INTEGRATIVE MANAGEMENT CONCEPT,
Environmental Protection Agency, Washington, D.C. Office of Research and Development.
For primary bibliographic entry see Field 6A.
W75-07529

COLORADO RIVER MANAGEMENT AND INTERNATIONAL LAW,
International Law Association, Mexico City.
For primary bibliographic entry see Field 6E.
W75-07530

THE FUTURE OF REGIONAL PLANNING IN THE UNITED STATES,
Council on Environmental Quality, Washington, D.C.
For primary bibliographic entry see Field 6B.
W75-07531

CRITERIA FOR THE DETERMINATION OF RECREATIONAL CARRYING CAPACITY IN THE COLORADO RIVER BASIN,
Forest Service (USDA), Missoula, Mont. Northern Forest Fire Lab.
For primary bibliographic entry see Field 6B.
W75-07533

STRATEGIES FOR ENVIRONMENTAL PLANNING IN THE UPPER COLORADO RIVER REGION,
California Univ., Berkeley. Dept. of Landscape Architecture.
For primary bibliographic entry see Field 6B.
W75-07534

AN EXAMINATION OF THE ENVIRONMENTAL CARRYING CAPACITY CONCEPT FOR THE AGRICULTURAL SECTOR OF THE COLORADO RIVER BASIN,
New Mexico State Univ., University Park.
For primary bibliographic entry see Field 3F.
W75-07535

TRANSPORTATION IN THE COLORADO RIVER BASIN,
Boston Aschmann Associates, San Jose, Calif.
For primary bibliographic entry see Field 6B.
W75-07540

URBANIZATION IN THE COLORADO RIVER BASIN,
Utah State Univ., Logan. Dept. of Political Science.
For primary bibliographic entry see Field 4C.
W75-07541

CONCEPTS OF CARRYING CAPACITY AND PLANNING IN COMPLEX ECOLOGICAL SYSTEMS,
Colorado State Univ., Fort Collins. Dept. of Sociology and Anthropology.
For primary bibliographic entry see Field 6A.
W75-07544

THE DEVELOPMENT AND ENVIRONMENTAL PROTECTION OF THE COLORADO RIVER BASIN,
Utah Agricultural Experiment Station, Logan.
For primary bibliographic entry see Field 6B.
W75-07545

FLOODS IN AND NEAR THE CHARLOTTE AMALIE AREA, ST. THOMAS, U.S. VIRGIN ISLANDS,
Geological Survey of Puerto Rico, San Juan.
For primary bibliographic entry see Field 7C.
W75-07550

TIME-OF-TRAVEL STUDY, LAKE ERIE-NIAGARA RIVER BASINS,
Geological Survey, Albany, N.Y.
For primary bibliographic entry see Field 5B.
W75-07554

COMPUTING BACKWATER AT OPEN CHANNEL CONSTRICTIONS,
Geological Survey, Bay Saint Louis, Miss. Gulf Coast Hydroscience Center.
For primary bibliographic entry see Field 8B.
W75-07558

VIBRATORY COMPACTION IN THE LABORATORY OF GRANULAR MATERIALS IN LONG COLUMNS,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 2F.
W75-07559

EXTENT AND FREQUENCY OF FLOODS ON SCHUYLKILL RIVER NEAR PHOENIXVILLE AND POTTSTOWN, PENNSYLVANIA,
Geological Survey, Harrisburg, Pa.
W. F. Busch, and L. C. Shaw.
Open-file report, September 1973. 29 p, 9 fig, 3 tab, 12 ref.

Descriptors: *Floods, *Pennsylvania, Flood frequency, Flood recurrence interval, Hydrologic data, Flood data, Stage-discharge relations, Flood profiles.
Identifiers: *Schuylkill River(Penn), Pottstown(Penn).

The extent and frequency of inundation are given for the Schuylkill River in the vicinity of Phoenixville and Pottstown, Pennsylvania. Streamflow data for the Schuylkill River are probably as abundant as those for any stream in the State. Records of peak gage heights and discharge on the Schuylkill River at Reading extend back to 1757. From 1757 to 1894, 19 floods were recorded. A record of annual flood peaks since 1928 is available for the Schuylkill River at Pottstown. A continuous record is also available for Philadelphia from 1932 to the present. By use of relations presented in this report, the extent, depth, and frequency of flooding can be estimated for any site along the reach of the Schuylkill River from Oaks to Pottstown. These flood data are presented so that regulatory agencies, organizations, and individuals may have a technical basis for making decisions on the use of flood-prone areas. (Knapp-USGS)
W75-07567

WATER RESOURCES DATA FOR GEORGIA, 1974.
Geological Survey, Doraville, Ga.
For primary bibliographic entry see Field 7C.
W75-07569

WATER RESOURCES OF THE CURLEW VALLEY DRAINAGE BASIN, UTAH AND IDAHO,
Geological Survey, Salt Lake City, Utah.
C. H. Baker, Jr.
Utah Department of Natural Resources Technical Publication No 45, 1974. 91 p, 9 fig, 5 plate, 9 tab, 27 ref.

Descriptors: *Water resources, *Groundwater basins, *Surface waters, *Idaho, *Utah, Groundwater, Hydrogeology, Hydrologic data, Basic data collections.
Identifiers: *Curlew Valley(Idaho-Utah).

The Curlew Valley drainage basin covers about 1,200 square miles in northern Utah and southern Idaho. Locomotive Springs are in the southern end of the basin. Runoff in this semiarid region is scanty, and the drainage basin includes only two small perennial streams. No water leaves the drainage basin in either of these streams. The principal aquifers in Curlew Valley are in valley-fill deposits that include unconsolidated deposits and volcanic rocks. Three major groundwater flow systems have been distinguished that contain water of suitable chemical quality for irrigation, and each is tapped locally by large-capacity wells. A fourth flow system, which contains hot, saline water, is present at depth in the western part of the valley. Comparison of the available measurements of the discharge at Locomotive Springs suggests that the discharge during 1969-72 was less than that mea-

sured in 1939 and 1967. This apparent decrease in spring discharge paralleled a period when withdrawals from wells were substantially increasing in Curlew Valley. (Knapp-USGS)
W75-07570

VELOCITY AND DEPTH MEASUREMENTS FOR USE IN THE DETERMINATION OF REAERATION COEFFICIENTS,
Geological Survey, Trenton, N.J.
For primary bibliographic entry see Field 2E.
W75-07572

HAS WISCONSIN ENOUGH WATER,
Geological Survey, Madison, Wis.
For primary bibliographic entry see Field 6D.
W75-07580

MAGNITUDE AND FREQUENCY OF FLOODS IN KANSAS--UNREGULATED STREAMS,
Geological Survey, Lawrence, Kans.
P. R. Jordan, and T. J. Irza.
Kansas Water Resources Board, Topeka, Streamflow Characteristics Technical Report No 11, February 1975. 34 p, 9 fig, 6 tab, 17 ref.

Descriptors: *Floods, *Kansas, *Flood frequency, Flood data, Peak discharge, Water yield, Hydrologic data, Flood recurrence interval.

Flood magnitudes for selected recurrence intervals for unregulated streams in Kansas are related most significantly to the contributing drainage area and the 2-year 24-hour rainfall. Equations are provided for estimating flood peaks for selected recurrence intervals at ungaged sites or at gaging stations having short records. The accuracy of 100-year floods calculated from the equation is equivalent to the accuracy that would be obtained from about 12 years of record of flood peaks at the site. Floods are most common May through August in western Kansas and from April through July in eastern Kansas. Maximum known floods on an envelope curve for western Kansas range from 2,440 cubic feet per second for 1.6 square miles to 178,000 cfs for 6,770 square miles. Maximum known floods on an envelope curve for eastern Kansas range from 7,080 cfs for 2.06 square miles to 436,000 cfs for 3,818 square miles. (Knapp-USGS)
W75-07581

ALTERNATIVE INFORMATION AND INTERACTION APPROACHES TO PUBLIC PARTICIPATION IN WATER RESOURCES DECISION MAKING - A STATE-OF-THE-ARTS REPORT,
North Carolina State Univ., Raleigh. Dept. of Sociology and Anthropology.
For primary bibliographic entry see Field 6B.
W75-07598

TEACHING WATER RESOURCE MANAGEMENT WITH THE AID OF A COMPUTER-IMPLEMENTED STIMULATOR,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Fisheries and Wildlife Sciences.
For primary bibliographic entry see Field 6B.
W75-07601

REGIONAL GROWTH AND WATER RESOURCE INVESTMENT,
Utah State Univ., Logan. Dept. of Economics.
For primary bibliographic entry see Field 6B.
W75-07615

EEL RIVER DEVELOPMENT ALTERNATIVES. APPENDIX,
California State Dept. of Water Resources, Sacramento.

Descriptors: *California, *Water resources development, *Alternate planning, *Estimated costs, Water supply, Flood control, Recreation, Direct costs, Cost allocation, Damsites, Project planning, Project feasibility.
Identifiers: *Eel River(Calif), Dos Rios Project(Calif).

The criteria and procedures used to evaluate various alternatives to the Eel River Dos Rios Project are detailed. The various developments were limited to direct projects costs, with the total cost of each project to be allocated among the various project purposes--flood control, recreation, and water supply. Water supply capabilities of each alternative were based on meeting the projected water needs in the Sacramento-San Joaquin Delta to maintain the contractual commitments of the existing State Water Project. A criterion was developed which allowed matching the amount of total active storage capacity in a reservoir system to the net water supply which would be available on a long-term basis. Project staging was based upon plans which would allow dams and tunnels to be constructed as late as possible. Each system should also be capable of meeting possible initial demands in 1986. Major cost items were estimated for anadronous fish preservation and recreation use. Costs of off peak pumping power were calculated on an annual capacity of $2.00/kw and an energy charge of 2.00 mills/kw/hr. The corresponding values for continuous pumping power were $26.50/kw and 1/00/kw/hr. The average annual costs represent an average annual equivalent of the capitalized costs, based on a 5% interest rate over the 100-year period. (Auen-Wisconsin)
W75-07616

SNOW ACCUMULATION AND MELT ALONG BORDERS OF A STRIP CUT IN NEW MEXICO,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
H. L. Gary.
U.S. Department of Agriculture, Forest Service, Research Note RM-279, 8 p, December, 1974. 4 fig, 1 tab, 9 ref.

Descriptors: *Clear-cutting, *Watershed management, *Water yield improvement, *Snowmelt, Forest management, Snowfall, Snow management, Snow, Runoff, New Mexico, Southwest U.S., Rocky Mountain Region, Melting, Snowpacks, Mountain forests, Water sources.

Snowfall amounts were similar along the sunny and shady borders of an east-west oriented clear-cut strip in New Mexico. Maximum snow accumulation was greater along both borders than in the adjacent forest. Periodic melting along the sunny border reduced the snowpack, but winter melt losses were somewhat balanced by melt crusts which prevented blowing snow. Snow disappeared 5 to 6 weeks earlier along the sunny border than along the shady border or forest interior. Melt rates along the shady border were 30-40% greater than those observed in the forest interior, but times of complete melt were the same. (Witt-IPC)
W75-07656

MONTEREY COUNTY MASTER DRAINAGE PLAN, SANTA RITA CREEK WATERSHED.
Monterey County Surveyors, Inc., Salinas, Calif; and McCreary-Koretsky-International, Salinas, Calif.
Monterey County Flood Control and Water Conservation District, Salinas, California, August 1972. 40 p, 1 fig, 4 tab, 2 ref, 1 addendum.

Descriptors: *Regional analysis, *Drainage engineering, *Runoff, *Flood control, *Surface drainage, *Planning, Long-term planning, California, Design criteria, Engineering design, Environmental control, Drainage districts, Drainage programs, Drainage systems, Environmental engineering.
Identifiers: *Monterey County(California), *Santa Rita Creek Watershed, *Master drainage plan.

Santa Rita Creek drains approximately 13.7 square miles of watershed into the Reclamation Ditch along State Highway 183 in Monterey County, California. Included in this area is the 4.2 square mile Espinosa Lake watershed which drains into Santa Rita Creek about 2,200 feet upstream of its juncture with the Reclamation Ditch. This study was made to evaluate the capacity of existing stormwater drainage and flood control structures and to prepare requirements for drainage in the future. A master drainage plan was prepared to: (1) develop criteria, procedures, and documents as the first step in establishing an overall County Master Drainage Plan adaptable to periodic updating; (2) assess the adequacy of the existing flood control features in the Santa Rita Creek study area considering both present and future land use; (3) determine the sizes and capacities required for new and replacement flood control features in the Santa Rita Creek study area considering future land use; and (4) to develop a recommended ordinance for the implementation and control of the County Master Drainage Plan. The Santa Rita Creek watershed was broken down into eleven watersheds. Primary attention was given to seven of these located in the main channel of Santa Rita Creek. These watersheds were studied at the present level of development and at a level projected for the year 1992 by the County Planning Department. The results of the hydrologic and hydraulic analyses indicate the inadequacy of several existing facilities to handle anticipated design flows. The principal uses of the master drainage plan will be in helping to alleviate existing problems. (Poertner)
W75-07661

MONTEREY COUNTY MASTER DRAINAGE PLAN EL TORO CREEK WATERSHED.
Monterey County Surveyors, Inc., Salinas, Calif.; and Koretsky King Associates, Inc., Salinas, Calif.
Monterey County Flood Control and Water Conservation District, Salinas, California, October 1974. 45 p, 3 tab, 9 ref.

Descriptors: *Regional analysis, *Drainage engineering, *Runoff, *Flood control, *Surface drainage, *Planning, Long-term planning, California, Design criteria, Engineering design, Environmental control, Drainage districts, Drainage programs, Drainage systems, Environmental engineering.
Identifiers: *El Toro Creek Watershed(California), *Monterey County(California), *Master drainage plan.

El Toro Creek watershed drains 42 square miles of land area into the Salinas River. It collects water from several tributaries which have been divided here into five groups of watersheds: Calera Canyon (4 watersheds) Corral de Tierra (3 watersheds), Below Calera and Corral de Tierra (2 watersheds), San Benancio and Harper Canyons (4 watersheds), and El Toro Creek (3 watersheds). In order to evaluate the capacity of existing structures and to prepare requirements for future structures, peak streamflow rates were determined at all critical watershed locations. This master drainage plan was prepared for the following reasons: (1) to prepare a Watershed Master Drainage Plan for the El Toro Creek Watershed as one step in establishing an overall County Drainage Plan, so that future development and future flood control work might proceed in an orderly and reasonable manner; (2) to establish design criteria for all future flood control works to be constructed within the study area; (3) using three criteria, to assess the adequacy of the existing major drainage facilities and flood control facilities within the study area to pass the design flows under present conditions and those of development planned for the future; and (4) to develop for the El Toro Creek Watershed recommendations for such legal instruments as are necessary to implement and control this Master Drainage Plan. To implement the master drainage

plan, it is suggested that a Watershed Zone Advisory Committee be established. The Committee would: evaluate planning progress, consolidate efforts of the region, advise the District on priorities for construction, recommend operation and maintenance programs. (Poertner)
W75-07662

MONTEREY COUNTY MASTER DRAINAGE PLAN, CARMEL VALLEY WATERSHEDS.
Monterey County Surveyors, Inc., Salinas, Calif; and Koretsky King Associates, Inc., Salinas, Calif.
Monterey County Flood Control and Water Conservation District, Salinas, California, June 1973. 47 p, 2 fig, 5 tab, 6 ref.

Descriptors: *Regional analysis, *Drainage engineering, *Runoff, *Flood control, *Surface drainage, *Planning, Long-term planning, California, Design criteria, Engineering design, Environmental control, Drainage districts, Drainage programs, Drainage systems, Enviromnmental engineering.
Identifiers: *Master drainage plan, *Monterey County(California), *Carmel Valley(California).

Carmel Valley encompasses a total area of approximately 12 square miles, and consists of 36 adjacent, but independent, watersheds. In order to evaluate the capacity of existing surface drainage and flood control structures and to prepare requirements for future structures, peak streamflow rates were determined at all critical locations. This master drainage plan was prepared for the following purposes: (1) to prepare a Watershed Master Drainage Plan for the Carmel Valley Watersheds as one step in establishing an overall County Drainage Plan, so the future development and future flood control works might proceed in an orderly and reasonable manner; (2) to establish design criteria for all future flood control works to be constructed within Monterey County; (3) using these criteria, to assess the adequacy of the existing major drainage facilities within the study area to pass the design flows under present and future planned development; (4) to determine the basic pattern of drainage and to indicate size, location, capacity and significant hydraulic characteristics of the required major facilities; and (5) to provide recommendations for such legal instruments necessary to implement and control this Master Drainage Plan. To implement the Master Drainage Plan, it was suggested that a Watershed Zone Advisory Committee be established. The purpose is to evaluate planning progress, consolidate efforts of the entire region, advise the District on priorities for construction of primary and secondary drainage facilities, recommend an operation and maintenance program, and keep the District informed on conditions of the Watershed Zone. (Poertner)
W75-07663

BANK AND CHANNEL PROTECTIVE LINING DESIGN PROCEDURES.
New York State Dept. of Transportation, Albany. Bureau of Soil Mechanics.
Soils Design Procedure, SDP-2, August, 1971. 65 p, 35 fig, 9 ref.

Descriptors: *Erosion control, *Channel erosion, *Bank protection, *Bank erosion, *Drainage engineering, *Channel improvement, Highways, Roads, Runoff, Soil types, Soil properties, Stream erosion, Soil mechanics, Storm runoff, Drainage effects, Drainage practices, Linings, Flow, Erosion, Erosion rate, Soil erosion, Engineering design, Design standards, New York.

Procedures and guidelines are presented for the design of bank and channel protective linings. The purpose is to present alternative methods for preventing detrimental erosion caused by runoff and stream flows along banks and in channels of natural or man-made watercourses. Because soil properties are a factor in erosion, the effects of soil type on protection requirements are discussed. Various types of bank and channel protection are described along with their limitations and advantages as determined from construction experience and field performance. The manual is profusely illustrated with photographs, sketches and design aids in the form of standard graphs and nomographs. Personnel of the New York State Department of Transportation are requested to use this manual in the design of all channels on all current and future projects. (Poertner)
W75-07665

FLOOD CONTROL IN COOK COUNTY,
League of Women Voters of Chicago, Ill.
November, 1972. 26 p, 4 fig, 2 tab, 10 ref.

Descriptors: *Waste water(Pollution), *Flood control, *Detention reservoir, *Combined sewers, *Illinois, *Lake Michigan, Flood flow, Flood discharge, Flood protection, Sewers, Storm water, Flood peak, Urbanization, Runoff, Overflow, Water pollution control, Tunnels, Underground storage.
Identifiers: *Cook County(Illinois).

Flood control in suburban Cook County involves solving present flooding problems and preventing future ones. Channelization and dredging can facilitate the removal of storm waters from an area. Construction of retention basins and ponds to hold water temporarily during peak flows can mitigate downstream flooding problems. While storm water is presently discharged to Lake Michigan, no new permits for outfalls to the lake have been granted since 1969. Prevention of future problems can be achieved by zoning to prohibit development on vulnerable flood plains and by requiring developers to provide storm water retention equal to the increased run-off caused by construction. The primary agency in Cook County which deals with waste water is the Metropolitan Sanitary District of Greater Chicago. Other agencies involved are the Cook County Forest Preserve District, the Division of Water Resources Management of the Illinois State Department of Transportation, the Northeastern Illinois Planning Commission, the Army Corps of Engineers, and the United States Soil Conservation Service. A proposed three billion dollar Chicago Underflow Plan is expected to take ten years for implementation. Sources of funding include all federal, state and local funds that could possibly be obtained for the abatement of water pollution. (Poertner)
W75-07674

RATTLESNAKE CREEK STUDY,
Wichita Water Dept., Kans.
G. J. Stramel.
January 1967. 31 p, 11 fig, 4 tab.

Descriptors: *Water quality, *Water quality control, *Diversion, *Runoff, *Subhumid climates, *Geology, Topography, Precipitation(Atmospheric), Irrigation, Infiltration, Aquifer characteristics, Aquifers, Aquifer testing, Hydrographs, Diversion structures, Closed conduits, Water rights, Groundwater, Hydraulics, Kansas.
Identifiers: Rattlesnake Creek(Kansas).

The Wichita Water Department conducted a reconnaissance survey to determine whether or not the good quality water flowing in Rattlesnake Creek can be salvaged by diversion to Cheney Reservoir. The survey showed that good quality water existed at all stages in the upper reaches of Rattlesnake Creek and that it might be relatively easy to divert the creek water from Rattlesnake Creek Basin to the North Fork of the Ninnescah River and on the Cheney Reservoir. Good quality water flowing into the lower reaches of the Rattlesnake Creek drainage basin mixed with natural high chloride water and was polluted. Most of the waters of Rattlesnake Creek will ultimately be consumed by irrigation and the Quivira Wildlife Refuge. Existing water rights and an anticipated growth in the establishment of additional water rights will leave little, if any water for out-of-basin diversion. Rattlesnake Creek alone offers no immediate help to the City of Wichita. The possibility exists of to diverting water from the Arkansas River into the Rattlesnake Creek basin, and thence to Cheney Reservoir. (Poertner)
W75-07676

USE OF MODELING FOR PLANNING STORM WATER STRATEGIES,
Florida Univ., Gainesville.
For primary bibliographic entry see Field 5G.
W75-07677

ECONOMICS OF COMBINED SEWAGE DETENTION FACILITIES,
San Francisco City and County Dept. of Public Works, Calif.
For primary bibliographic entry see Field 5G.
W75-07680

APPLICATION AND TESTING OF THE EPA STORMWATER MANAGEMENT MODEL TO GREENFIELD, MASSACHUSETTS,
Massachusetts Univ., Amherst. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5G.
W75-07681

LANDSCAPE TENDING AND NATURE CONSERVATION AS PARTIAL TASKS FOR SOCIALISTIC LAND DEVELOPMENT,
L. Bauer, and H. Weinitschke.
VEB Gustav Fischer Verlag: Jena, East Germany. 1973. 3rd Ed 382 p, Illus. Maps.

Descriptors: *Conservation, *Forest management, *Pollution control, Soil conservation, Lakes, Regulation, Legal aspects.
Identifiers: Forestation.

This 3rd edition, intended for nature conservationists, consists of sections concerning the basics of landscape care, including forests, water balance, terrain and soil problems; reforestation, forest-field disturbution, care of lakes, air, disposal of refuse, noise pollution, biocidal effects and construction; nature protection as a contribution to landscape care; legal regulations; and the activities of the International Union for Conservation of Nature and Natural Resources. A bibliography, an index, 144 illustrations and 47 tables are included.--Copyright 1974, Biological Abstracts, Inc.
W75-07707

RIVER FORECASTS PROVIDED BY THE NATIONAL WEATHER SERVICE, VOLUME 1, 1972.
National Weather Service, Office of Hydrology. Silver Spring, Md.
Available from National Climatic Center, Asheville, NC 28801, for $0.75. 1973, 62 p.

Descriptors: Rivers, *Forecasting, *Flood forecasting, Hydrology, Tables(Data), Warning systems, Floods, Water supply, Data acquisition, Surface waters, Flood control, United States, *River forecasting, *Hydrologic data.

River forecasts and warnings, as well as other National Weather Service hydrologic services are described and information is given on: Hydrologic operations, forecasts and services; River Forecast Centers; NWS Field Offices; Data Acquisition Networks; Flash Flood Warning Program; Water Supply Forecasting Program; Highest stages at National Weather Service gages; and Record high stages prior to gage records. Indexes are arranged by states, stations, and rivers. A list of water supply forecast points is included. Illustrations in-

cluded are: Map of River Centers, Map of Local NWS Offices, Map of Radar Network, Hydrologic Forecast System Chart, and Operations Chart-River and Flood Forecast and Warning Program. (NOAA)
W75-07717

STUDIES ON SOIL EROSION CONTROL: 4. THE HYDRAULIC STUDIES OF WATER FLOW IN SLOPED LAND (IN JAPANESE),
Obihiro Zootechnical Univ. (Japan). Lab. of Agricultural and Civil Engineering.
Y. Matsuda.
Res Bull Obihiro Zootech Univ Ser I. Vol 7, No 4, p 688-703, 1973, English summary.

Descriptors: *Soil erosion, Open channel flow, *Impact(Rainfall), Raindrops.

Water flow which erodes soil of fields is primarily attributable to rainfall, in which case part of the raindrops flow to a lower level, infiltrating the soil as they flow. This process is, therefore distinguished from general open channels because flow in the latter case permits lateral inflow and outflow. However, because water passages soon occur, rainfall cannot flow uniformly over the land. However, if ideal flow conditions are assumed, theoretical solutions for water surface profile may be derived and compared with experimental values. Variations of the general equation were combined and each water head and velocity in a given elevation was calculated. Each shearing force, which was equivalent to the tractive force on the base, was calculated using another equation. From the 2 equations, the effects of slope, infiltration rate and the roughness coefficient were evaluated and it was concluded that the effect of the roughness coefficient was the most significant.--Copyright 1973, Biological Abstracts, Inc.
W75-07756

A TURNING POINT,
Department of Housing and Urban Development, Washington, D.C.
For primary bibliographic entry see Field 6F.
W75-07765

MAINTENANCE OF BAY RIDGE AND RED HOOK CHANNELS, NEW YORK NAVIGATION PROJECT (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Army Engineer District, New York.
For primary bibliographic entry see Field 8A.
W75-07784

THE MENDOTA WATERSHED PROJECT, LASALLE AND BUREAU COUNTIES, ILLINOIS (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Soil Conservation Service, Champaign, Ill.
For primary bibliographic entry see Field 4D.
W75-07785

PEACOCK CREEK, LIBERTY COUNTY, GEORGIA (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Army Engineer District, Savannah, Ga.
Available from the National Technical Information Service, U.S. Dept. of Commerce, Springfield, Va. 22161, as EIS-GA-73-0416-F, $4.25 in paper copy, $2.25 in microfiche. November 1972. 70 p, 9 tab, 4 map.

Descriptors: *Flood control, *Flood protection, *Channel improvement, Standing waters, Oxygen, Channels, Environmental effects, Turbidity, Georgia, Surface waters, Water temperature, Flooding, Hardwood, Storms, Floods, Biota, Wildlife, Fish.
Identifiers: *Environmental Impact Statements, *Peacock Creek(Geo), Liberty County(Geo).

The project involves initiation of flood control measures on Peacock Creek, Liberty County, Georgia and consists of improving channel dimensions, snagging, and clearing of the creek. The environmental impact of the project will be to provide flood protection, afford the orderly removal of standing surface water, stimulate area development, and enhance the environment for human habitation. The adverse environmental effects include removal of hardwoods and other biota from project right-of-way, possible increase in water temperature, probable decrease in dissolved oxygen, and temporary turbidity during construction. The following alternatives were considered: snag and clear channels only, provide flood protection from 5 to 10 year storm frequencies, and no action. (Gagliardi-Florida)
W75-07788

UPPER SALT CREEK WATERSHED, COOK, LAKE AND DUPAGE COUNTIES, ILLINOIS (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Soil Conservation Service, Washington, D.C.
For primary bibliographic entry see Field 8A.
W75-07789

THE WINDS, CURRENTS AND WAVES AT THE SITE OF THE FLOATING CITY OFF WAIKIKI,
Hawaii Univ., Honolulu. Dept. of Ocean Engineering.
M. St. Denis.
Report UNIHI-Seagrant-CR-75-01, December 1974. 95 p. Hawaii's Floating City (Development Program). NOAA Grant OSG 04-5-158-17.

Descriptors: *Engineering structures, *Offshore platforms, *Forecasting, Estimating, Evaluation, Future planning(Projected), Projections, Risks, Winds, Cyclones, Tropical cyclones, Waves(Water), Ocean waves, Currents(Water), Water circulation, Ocean circulation, Ocean currents, *Hawaii.
Identifiers: *Floating City(HA), *Floating platforms, *Waikiki(HA), Trade winds, Kona winds, Tidal currents, Wind drift, Ekman drift, Oceanic flow.

Long-term forecasts are presented of winds, currents and waves at a station some three miles off Waikiki selected as a possible site for a floating platform to house a community of oceanic denizens. The forecasts are to be used to design the platform. Detailed information is given on wind types (trade and Kona winds); Kona storms; and tropical cyclones. The general circulation, tidal currents, Ekman or wind drift, and large scale oceanic flow is described as are wave patterns, swells, cyclonic waves and long-term wave trends common to the area. (NOAA)
W75-07826

FLOOD CONTROL, SEABROOK MARINE LABORATORY, TEXAS,
Texas Parks and Wildlife Dept., Austin.
For primary bibliographic entry see Field 8A.
W75-07829

DIGITAL RADAR DATA AND ITS APPLICATION IN FLASH FLOOD FORECASTING,
National Weather Service Forecast Office, Pittsburgh, Pa.
D. D. Sisk.
Available from National Technical Information Service, U.S. Department of Commerce, Sills Bldg 5285 Port Royal Road, Springfield, Va 22161.

Descriptors: *Flood forecasting, *Flash floods, *Instrumentation, *Warning systems, *Radar, Digital computers, Forecasting, Estimating, Measurement, Probability, Programs, Forecasting.
Identifiers: *Digital radar data, D/RADEX.

Digitized Radar Experiments (D/RADEX) were desgined to assist in the development, testing and evaluation of techniques for automatic processing and presentation of weather radar data in real-time for operational applications. A minicomputer and its related processing and interface equipment are used to take over control of the radar for approximately twenty seconds to collect radar video returns for archiving and printout displays. A case study is presented that illustrates how D/RADEX can assist in determining areas of potential flash flooding. The D/RADEX hydrological printout is used and illustrated. (NOAA)
W75-07832

MAP SHOWING DRAINAGE AREAS, HADDAM QUADRANGLE, CONNECTICUT,
Geological Survey, Hartford, Conn.
For primary bibliographic entry see Field 7C.
W75-07839

MAP SHOWING DRAINAGE AREAS, GUILFORD QUADRANGLE, CONNECTICUT,
Geological Survey, Hartford, Conn.
For primary bibliographic entry see Field 7C.
W75-07840

MAP SHOWING DRAINAGE AREAS, BRANFORD QUADRANGLE, CONNECTICUT,
Geological Survey, Hartford, Conn.
For primary bibliographic entry see Field 7C.
W75-07841

MAP SHOWING DRAINAGE AREAS, NEW HAVEN-WOODMONT QUADRANGLES, CONNECTICUT,
Geological Survey, Hartford, Conn.
For primary bibliographic entry see Field 7C.
W75-07842

MAP SHOWING DRAINAGE AREAS, NIANTIC QUADRANGLE, CONNECTICUT,
Geological Survey, Hartford, Conn.
For primary bibliographic entry see Field 7C.
W75-07843

MAP SHOWING DRAINAGE AREAS, OLD LYME QUADRANGLE, CONNECTICUT,
Geological Survey, Hartford, Conn.
For primary bibliographic entry see Field 7C.
W75-07844

PEARL RIVER BOATWAY, ROSS BARNETT RESERVOIR TO JACKSON AREA,
Geological Survey, Jackson, Miss.
For primary bibliographic entry see Field 7C.
W75-07847

PEARL RIVER BOATWAY MAP, MONTICELLO TO MORGANTOWN, MISSISSIPPI,
Geological Survey, Jackson, Miss.
For primary bibliographic entry see Field 7C.
W75-07849

PEARL RIVER BOATWAY MAP, GEORGETOWN TO MONTICELLO, MISSISSIPPI,
Geological Survey, Jackson, Miss.
For primary bibliographic entry see Field 7C.
W75-07850

4B. Groundwater Management

WATER SUPPLY IN CENTRAL AND SOUTHERN APACHE COUNTY,
Arizona Water Commission, Phoenix.
P. S. Osborne, and P. C. Briggs.
June 1974. 12 p, 8 fig, 4 ref.

Descriptors: *Water supply development, *Water quality, *Wells, *Aquifer systems, *Groundwater resources, Depth, Groundwater availability, *Arizona, Geologic units.
Identifiers: Apache County(Ariz).

Rapid growth in the number of subdivisions within Apache County has prompted the need for increased water supplies. Summaries are presented of information regarding groundwater supplies to aid in deciding whether further subdivision should be approved. Figures provide information such as depth of water, potential well yields, and water quality. The availability and suitability of water in several aquifer systems are described. The most heavily used aquifers at present are the Kaibab-Coconino and the recent alluvium. The Cretaceous rocks appear to have the most potential for future development. Depth of water ranges from less than 200 feet to 500 feet. Maximum yield reported from this system is 130 gpm, and water quality is good with the total dissolved solids content ranging from 300-500 ppm. (Mastic-Arizona)
W75-07370

THE CENTRAL ARIZONA PROJECT, A STAFF REPORT TO THE METROPOLITAN UTILITIES MANAGEMENT AGENCY BOARD AND THE MAYOR AND COUNCIL OF THE CITY OF TUCSON,
Tucson Metropolitan Utilities Management Agency Board, Ariz.
J. McGill, and H. Holub.
October 1974. 133 p, 17 fig, 27 ref.

Descriptors: *Groundwater resources, *Water law, *Colorado river, *Water costs, *Water supply, Groundwater mining, Subsidence, Irrigation, Water demand, Aqueducts, *Arizona, Irrigation water, Population, Water quality.
Identifiers: *Central Arizona Project(CAP), Tucson(Ariz), Farm land retirement.

The Central Arizona Project (CAP) consists of an aqueduct system to carry water from Lake Havasu on the Colorado River to the Phoenix and Tucson areas of Central Arizona in order to supplement the rapidly diminishing groundwater supplies. Presented are a history and description of CAP, and a discussion of the effects of CAP on Arizona and particularly on the City of Tucson. Costs for the project and the water it will supply are discussed. A primary objective was to present information for making the decision of whether or not the City of Tucson should contract for CAP water. Problems include the possibility of subsidence as groundwater supplies are used up, Tucson's projected population growth, retirement of irrigated farm land, the relatively high cost of CAP water, and the need for water law reform. Recommendations call for contracting small amounts of CAP water in the initial years particularly if no attempt is made to check population growth in the City, and to continue retirement of farm land while pursuing water law reforms to change the financing methods of the CAP. (Mastic-Arizona)
W75-07372

WATER RIGHTS,
Wisconsin Univ., Madison. School of Law.
For primary bibliographic entry see Field 6E.
W75-07378

SURFACE PLUGGING DURING BASIN RECHARGE OF TURBID WATER,
Southwestern Great Plains Research Center, Bushland, Tex.
O. R. Jones, D. W. Goss, and A. D. Schneider.
Transactions of the American Society of Agricultural Engineers, Vol 17, No 6, p 1011-1019, November-December 1974. 7 fig, 2 tab, 9 ref.

Descriptors: *Artificial recharge, *Pit recharge, *Groundwater recharge, *Suspended solids, Infiltration rates, Playas, *Texas, Basins.
Identifiers: *Ogallala aquifer, Recharge rates.

Three experimental recharge basins were excavated to determine if artificial recharging of playa water on the Southern High Plains to the Ogallala aquifer is practical. To establish guidelines and standards for the operation of such basins, it is necessary to develop relationships between the permeability of the Pleistocene sediments that overlie the Ogallala aquifer, suspended solids content of the water supply, and quantity of playa water that can be recharged before plugging limits recharge to critically low rates. Most suspended solids in playa water were deposited on or near the surface during basin recharge, except where cracking of the basin surface allowed sediment deposition at undetermined depths. Although plugging was related to the amount of suspended solids introduced into the basin with the recharge water, the total amount of suspended solids required to cause plugging varied by an order of magnitude between tests. The major factor limiting recharge of turbid water through excavated basins was plugging on or near the surface. While substantial quantities of turbid water can be recharged, pretreatment to remove part of the suspended solids load should improve basin performance. (Gibb-ISWS)
W75-07439

INVESTIGATION AND REHABILITATION OF A BRINE-CONTAMINATED AQUIFER,
Engineering Enterprises, Inc., Norman, Okla.
For primary bibliographic entry see Field 5B.
W75-07441

THIRTY-FIVE YEARS OF CONTINUOUS DISCHARGE OF SECONDARY TREATED EFFLUENT ONTO SAND BEDS,
Rensselaer Polytechnic Inst., Troy, N.Y. Dept. of Environmental Engineering.
For primary bibliographic entry see Field 5B.
W75-07442

THE CONFIGURATION OF CONTAMINATION ENCLAVES FROM REFUSE DISPOSAL SITES ON FLOODPLAINS,
Iowa State Univ., Ames. Dept. of Earth Sciences.
For primary bibliographic entry see Field 5B.
W75-07443

WATER LEVEL FLUCTUATIONS DUE TO EARTH TIDES IN A WELL PUMPING FROM SLIGHTLY FRACTURED CRYSTALLINE ROCK,
Du Pont de Nemours (E.I.) and Co., Aiken, S.C. Savannah River Lab.
For primary bibliographic entry see Field 5B.
W75-07463

ANALYSIS OF FLOW TO AN EXTENDED FULLY PENETRATING WELL,
Pahlavi Univ., Shiraz (Iran).
I. Javandel, and N. Zaghi.
Water Resources Research, Vol 11, No 1, p 159-164, February 1975. 10 fig, 10 ref.

Descriptors: *Groundwater, *Water wells, *Potential flow, Hydraulics, Groundwater potential, Fourier analysis, Groundwater movement, Water yield, Safe yield, Discharge(Water).
Identifiers: Radially extended wells.

An analytic solution was derived yielding the potential distribution in a bounded confined aquifer pumped by a well that was radially extended at the bottom. An exact solution for the rate of discharge was found by which the effect of local radial extension on the increase of the pumping rate was studied. Solutions were evaluated numerically, and the results were presented graphically in terms of dimensionless parameters. The results showed that production rate is doubled in some cases by extending the bottom of the well. (Gibb-ISWS)
W75-07464

NEW EQUATIONS FOR DETERMINING THE FORMATION CONSTANTS OF AN AQUIFER FROM PUMPING TEST DATA,
Sheffield Univ. (England). Dept. of Civil and Structural Engineering.
N. S. Boulton, and T. D. Streltsova.
Water Resources Research, Vol 11, No 1, p 148-153, February 1975. 2 fig, 5 tab, 11 ref, 1 append.

Descriptors: *Groundwater, *Pumping, *Aquifer testing, Confined water, Aquicludes, Permeability, Drawdown, Storage coefficient, Transmissivity, Hydraulics, Hydrologic properties, Equations, Sandstones.
Identifiers: Partial penetrating wells, Type curve solutions, *Great Britain, Bunter sandstone.

New equations were given, based on an extended theory, that take into account the following factors: the compressibility and anisotropy of the main aquifer; the partial penetration of the abstraction well; the depth at which the drawdown in an observation well is measured; the existence of a low-permeability layer, called 'the aquitard,' above the aquifer; and the saturated and unsaturated zones above the water table. A practical method of evaluating the formation constants for an aquifer from pumping test data was fully discussed. Type curves based on the new equations were used to analyze data from a pumping test in the thick Bunter sandstone formation of Shropshire (Great Britain). A correction for the water derived from storage within the abstraction well was found to be necessary. (Gibb-ISWS)
W75-07465

AN EVALUATION OF THE SUITABILITY OF ERTS DATA FOR THE PURPOSES OF PETROLEUM EXPLORATION,
Earth Satellite Corp., Washington, D.C.
For primary bibliographic entry see Field 7B.
W75-07488

MINERAL RESOURCES, GEOLOGICAL STRUCTURE, AND LANDFORM SURVEYS,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
For primary bibliographic entry see Field 7C.
W75-07500

OREGON'S APPROACH TO GROUNDWATER INVESTIGATIONS,
Oregon State Engineer's Office, Salem.
J. R. Illian.
In: Land and Water Use in Oregon; Seminar conducted by Oregon State University, Spring Quarter 1974, Water Resources Research Institute, Corvallis, Oregon, p 97-112, July 1974. 12 fig.

Descriptors: *Groundwater, *Oregon, *Model studies, Hydrogeology, Hydrologic cycle, Recharge, Discharge(Water), Aquifers, Groundwater resources, Underground streams, Underflow, Water quality, Dissolved solids, Temperature, Pumping, Drawdown.

The Oregon State Engineer's Office, in cooperation with the Oregon State Water Resources Board, expanded the Ground-Water Basins Investigation Program in June 1972. This statewide program is intended to determine the general extent and characteristics of each groundwater basin and to ascertain the degree to which groundwater may serve as an alternative to surface water supplies. A description of the origin, purpose, procedures, and progress of this program was presented. A general conceptual model of the groundwater resources of Oregon was described. This conceptual model will be used as a basis for the development of a mathematical model which will make possible the investigation of the effects of various assumed stresses. With this capability, the optimum scheme of development can be identified prior to large scale development. (See also W75-07507) (Sims-ISWS)

W75-07516

GEOHYDROLOGY OF BACA AND SOUTHERN PROWERS COUNTIES, SOUTHEASTERN COLORADO,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 7C.
W75-07551

HYDROLOGIC RECORDS FOR LAKE COUNTY, FLORIDA, 1972-73,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 2E.
W75-07566

WATER RESOURCES DATA FOR GEORGIA, 1974.
Geological Survey, Doraville, Ga.
For primary bibliographic entry see Field 7C.
W75-07569

WATER RESOURCES OF THE CURLEW VALLEY DRAINAGE BASIN, UTAH AND IDAHO,
Geological Survey, Salt Lake City, Utah.
For primary bibliographic entry see Field 4A.
W75-07570

FIELD TRIP GUIDE BOOK FOR HYDROGEOLOGY OF THE TWIN CITIES ARTESIAN BASIN,
Geological Survey, Denver, Colo.
T. C. Winter, and R. F. Norvitch.
Paper prepared for Annual Meeting of the Geological Society of America and Associated Societies, Minneapolis, Minn: Minnesota Geological Survey, 1972. 35 p, 13 fig, 1 tab, 10 ref. (Available from the Minnesota Geological Society) $3.00.

Descriptors: *Hydrogeology, *Minnesota, Water supply, Aquifers, *Groundwater, Water yield, Water quality, Water utilization, Cities, Artesian aquifers.
Identifiers: *Minneapolis-St. Paul(Minn), *Twin Cities(Minn).

This field trip guide focuses on several of the significant aspects of the hydrogeology of the Minneapolis-St. Paul (Twin Cities) area. Emphasis is placed on the principal bedrock aquifer and the role of glacial drift in the hydrology. Stops include field examination of the Jordan-Prairie du Chien aquifer, a well-screen manufacturing plant and its research well field, views of surface expression of partly buried bedrock valleys, an artificial-recharge site where experiments were run on deep-well water injection into the Prairie du Chien Group (carbonate rock), and a site where groundwater discharges as a large spring from the Prairie du Chien Gruoup. Although much glacial geology is seen along the trip route, emphasis is placed on the drift-filled bedrock valleys. The Twin Cities supply themselves and 13 surrounding municipalities with water from the Mississippi River. Water from a large number of wells within the cities is used mainly for industry and air conditioning. In addition, most suburban communities use groundwater to the extent that groundwater now exceeds surface water as a source of supply. Total groundwater use in 1970 in the metropolitan area was 194 mgd; 48 mgd was for domestic purposes, 75 mgd for air conditioning, 100 mgd for industrial and commercial purposes, and 38 mgd for irrigation. The amount of groundwater that can be developed in the metropolitan area on a sustained basis is about 845 mgd. (Knapp-USGS)
W75-07573

SIMULATED WATER-LEVEL CHANGES RESULTING FROM PROPOSED CHANGES IN GROUND-WATER PUMPING IN THE HOUSTON, TEXAS, AREA,
Geological Survey, Houston, Tex.
For primary bibliographic entry see Field 7C.
W75-07575

HAS WISCONSIN ENOUGH WATER,
Geological Survey, Madison, Wis.
For primary bibliographic entry see Field 6D.
W75-07580

A SPECIAL PLANNING TECHNIQUE FOR STREAM-AQUIFER SYSTEMS,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 2A.
W75-07584

CHEMICAL QUALITY OF GROUND WATER IN HAWAII,
Geological Survey, Honolulu, Hawaii.
For primary bibliographic entry see Field 5A.
W75-07585

STOCHASTIC MODELING OF GROUNDWATER SYSTEMS,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2F.
W75-07595

POLLUTED GROUNDWATER: ESTIMATING THE EFFECTS OF MAN'S ACTIVITIES,
General Electric Co., Santa Barbara, Calif. Center for Advanced Studies.
For primary bibliographic entry see Field 5B.
W75-07698

RATIONALE AND METHODOLOGY FOR MONITORING GROUNDWATER POLLUTED BY MINING ACTIVITIES,
General Electric Co., Santa Barbara, Calif. Center for Advanced Studies.
For primary bibliographic entry see Field 5B.
W75-07710

SYSTEM IDENTIFICATION AND MULTI-LEVEL OPTIMIZATION OF INTEGRATED GROUND WATER SYSTEMS,
California Univ., Los Angeles. Dept. of Engineering Systems.
For primary bibliographic entry see Field 2F.
W75-07722

GROUND-WATER PROTECTION IN PENNSYLVANIA, A MODEL STATE PROGRAM,
Geraghty and Miller, Port Washington, N.Y.
August 1974. 15 p, 2 tab, 1 map.

Descriptors: *Groundwater resources, *Water resources, *Pennsylvania, *Water pollution, Water pollution sources, Groundwater, Groundwater availability, Subsurface waters, Water supply, Water demand, Water resources development, Water law, Water sources, Subsurface waters, Runoff.

Many states are in the process of updating laws and regulations to facilitate the correction and control of serious ground-water pollution. Pennsylvania has a program with clearly stated objectives and backed by a well-informed technical and legal staff with legislative support for enforcement procedures. Groundwater is to a large extent quality controlled by activities of man on the land. Most industrial and urban undertakings capable of affecting Pennsylvania's groundwater are covered by regulations requiring reports detailing the anticipated effects. Groundwater is highly susceptible to pollution and carries a high potential for polluting surface water. During the drier months, Pennsylvania streamflow may be composed of as much as 100% ground-water discharge. Groundwater pollution may be irreparable for hydrogeologic or economic reasons. Pennsylvania regulations accordingly discourage the growth of potentially damaging activities such as subsurface waste disposal wells. A graph and map are included. (Proctor-Florida)
W75-07777

GEOTHERMAL LEASING PROGRAM, VOL IV, APPENDIX I, COMMENTS ON DRAFT IMPACT STATEMENT AND PROPOSED REGULATIONS (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Department of the Interior, Washington, D.C.
For primary bibliographic entry see Field 8B.
W75-07781

AVAILABILITY OF GROUND WATER IN THE SACO RIVER BASIN, EAST-CENTRAL NEW HAMPSHIRE,
Geological Survey, Concord, N.H.
For primary bibliographic entry see Field 7C.
W75-07837

MAPS OF SAN GORGONIO PASS-UPPER COACHELLA VALLEY AREA, CALIFORNIA, SHOWING WATER-LEVEL CONTOURS, 1936 AND 1966-17,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 7C.
W75-07838

GEOLOGIC MAP OF WALKER COUNTY, ALABAMA,
Geological Survey, Tuscaloosa, Ala.
For primary bibliographic entry see Field 7C.
W75-07845

WATER AVAILABILITY AND GEOLOGY OF WALKER COUNTY, ALABAMA,
Geological Survey, Tuscaloosa, Ala.
For primary bibliographic entry see Field 7C.
W75-07846

4C. Effects On Water Of Man's Non-Water Activities

SOME USES OF SOIL STABILIZERS IN THE USA,
Agricultural Research Service, Ames, Iowa. Soil and Water Conservation Research Div.
For primary bibliographic entry see Field 2J.
W75-07374

CHANGE IN THE PHYSIOCOCHEMICAL COMPOSITION OF WATER UNDER THE EFFECT OF FELLINGS,
Severo-Kavkazskaya Lesnaya Opytnaya Stantsiya, Maykop (USSR).
For primary bibliographic entry see Field 5B.
W75-07429

THE EFFECTS OF GEOLOGY AND LAND USE ON THE EXPORT OF PHOSPHORUS FROM WATERSHEDS,
Toronto Univ. (Ontario). Dept. of Zoology.
For primary bibliographic entry see Field 5B.
W75-07470

TRANSPORTATION IN THE COLORADO RIVER BASIN,
Boston Aschmann Associates, San Jose, Calif.
For primary bibliographic entry see Field 6B.
W75-07540

URBANIZATION IN THE COLORADO RIVER BASIN,
Utah State Univ., Logan. Dept. of Political Science.
C. W. Hiibner.
In: Environmental Management in the Colorado River Basin, October 15-16, 1973, Salt Lake City, Utah, Utah State University Press, Logan, 1974, p 216-240, 19 ref, 11 tab, 1 fig, 3 append.

Descriptors: *Colorado River Basin, *Urbanization, *Ecosystems, *Land use, Water resourses, *Water pollution, *Long-term planning, Human population, Arizona, Utah, Colorado, New Mexico, California, Nevada, Wyoming, Pollutants, Air pollution.
Identifiers: Environmental management.

The recent urbanization process in the Colorado River Basin and its relationship to agriculture, recreation, transportation and energy are examined. The concept of a 'carrying capacity' can be applied to man-made, man-dominated urban systems, which, like natural ecosystems, have resource pollution limits. The 11 states having jurisdiction in the Colorado River Basin have 25 urbanized areas (population over 50,000). Basically, the region is empty with scattered urban centers. This highly urbanized area will become more so in the future. Over the past 20 years, 43 percent of the region's growth has come from migration and many of the rural counties have suffered population declines. This movement to the cities has brought a conflict between agricultural and urban use of the scarce good land and water. Another problem facing the basin is that the relatively unpopulation and politically impotent area might be used as a sink for urban waste products. At present, the states of the basin lack the political power to control the use of the basin's environment. (See also W75-07525) (Bowden-Arizona)
W75-07541

URBANIZATION WITH OR WITHOUT ENVIRONMENTAL QUALITY,
United States International Univ., San Diego, Calif.
T. A. MacCalla.
In: Environmental Management in the Colorado River Basin, October 15-16, 1973, Salt Lake City, Utah, Utah State University Press, Logan, 1974, p 241-259, 20 ref, 1 fig, append.

Descriptors: *Colorado River Basin, *Human population, *Land use, *Urban impact, Arizona, Utah, Wyoming, Colorado, Nevada, California, New Mexico.
Identifiers: Environmental management.

Taking urbanization as the process and environmental quality as the product, the growth of cities as seen as irreversible and the real question is what kind of environmental quality is probable or possible in this future growth. A five point urban forecast is made for the United States: (1) Blacks and other minorities will dominate 13 central cities by 1985 and the school systems of 11 more; (2) the working age population (20-64) will rise from 106 million in 1970 to 136 million by 1985; (3) the biggest population growth between 1970 and 1985 will be the addition of 26 million apartment dwellers ages 25-54; (4) the number of people over 65 will double to 31 million; (5) people under 25 will constitute 45 percent of the population in 1985. This urban growth makes the adoption of an environmental conscience mandatory for human survival. Since the urban growth cannot be stopped, comprehensive planning is essential to ensure environmental quality. With such densities of humans, the environment will not be a luxury but a necessity for the health of communities. (See also W75-07525) (Bowden-Arizona)
W75-07542

EFFECT OF PORT ORANGE BRIDGE-CAUSEWAY ON FLOW OF HALIFAX RIVER, VOLUSIA COUNTY, FLORIDA,
Geological Survey, Tallahassee, Fla.
W. C. Bridges.
Open-file report 72005, 1972. 19 p, 5 fig, 1 tab.

Descriptors: *Streamflow, *Bridges, *Florida, Profiles, Flow profiles, Backwater, Regime, Tides, Lagoons, Water levels.
Identifiers: *Halifax River(Fla).

The effects of the Port Orange bridge-causeway on the flow of the Halifax River, Florida, are described. Flood-tide profiles indicate a small degree of restriction of streamflow. Part of this may be caused by oyster bars and part by the bridge-causeway. Differences in water-surface elevations of 0.30 foot at the relief culvert represent the maximum effect on the river by the bridge-causeway. The maximum velocity measured on the ebb tide was 2.26 fps. (Knapp-USGS)
W75-07555

WATERSHED MANAGEMENT IN ARIZONA'S MIXED CONIFER FORESTS: THE STATUS OF OUR KNOWLEDGE,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
L. R. Rich, and J. R. Thompson.
U.S. Department of Agriculture, Forest Service, Research Paper RM-130, 18 p, December 1974. 3 fig, 3 tab, 45 ref.

Descriptors: *Watershed management, *Arizona, *Forest management, *Mixed forests, *Water yield improvement, Vegetation, Land clearing, Evapotranspiration, Soil moisture, Snow cover, Snowmelt, Coniferous forests, Wildlife, Aesthetics, Southwest U.S., Water yield, Clear-cutting, Streamflow, Forest watersheds.

Removing mixed conifer forest vegetation has increased water yields approximately in proportion to the percent of the area in cleared openings. Most of the yield increase can be accounted for by the reduction in evapotranspiration. Reduced soil-moisture deficit and increased snow accumulation and melt rates in the cut openings contribute to these increases. When fitted to the timber-stand structure, patchcutting is compatible with recommended mixed conifer silviculture, beneficial to wildlife, and esthetically pleasing. Although mixed conifer areas make up only 0.4% of the total land area of Arizona, they contribute 6% of the State's water yield. Intensive management of these forest lands could increase annual streamflow 36,500 acre-feet/year, roughly 12 billion gallons of water/year. (Witt-IPC)
W75-07648

A MODEL FOR PREDICTING EROSION AND SEDIMENT YIELD FROM SECONDARY FOREST ROAD CONSTRUCTION,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
C. F. Leaf.
U.S. Department of Agriculture, Forest Service, Research Note RM-274, 4 p, December, 1974. 2 fig, 1 tab, 7 ref.

Descriptors: *Forests, *Roads, *Sediment yield, *Erosion, Soil erosion, *Colorado, Rocky Mountain Region, Mountain forests, Lumbering, Access routes, Road construction, Forest watersheds, Mathematical models, Sediments, Water quality.

One of the more visible and controversial environmental impacts associated with timber harvesting and development in central Colorado is road construction. Better tools are needed to quantify the effect of soil disturbance on erosion onsite, and the subsequent yield of sediment downstream. This note summarizes available data and proposes a preliminary model for predicting an index of onsite erosion and downstream sediment yield. (Witt-IPC)
W75-07653

RUNOFF AND EROSION AFTER BRUSH SUPPRESSION ON THE NATURAL DRAINAGE WATERSHEDS IN CENTRAL ARIZONA,
Arizona State Univ., Tempe.
For primary bibliographic entry see Field 3B.
W75-07655

PEARL RIVER BOATWAY MAP, MORGANTOWN TO SANDY HOOK, COLUMBIA AREA, MISSISSIPPI,
Geological Survey, Jackson, Miss.
For primary bibliographic entry see Field 7C.
W75-07848

4D. Watershed Protection

NUTRIENT AND SEDIMENT PRODUCTION FROM FORESTED WATERSHEDS,
Nevada Agricultural Experiment Station, Reno.
For primary bibliographic entry see Field 5B.
W75-07353

STRUCTURAL PROBLEMS OF INDONESIAN SOILS,
Lembaga Penelitian Tanah, Bogor (Indonesia).
For primary bibliographic entry see Field 2G.
W75-07394

THE EFFECTS OF GEOLOGY AND LAND USE ON THE EXPORT OF PHOSPHORUS FROM WATERSHEDS,
Toronto Univ. (Ontario). Dept. of Zoology.
For primary bibliographic entry see Field 5B.
W75-07470

GULLY EROSION, NORTHWESTERN COLORADO: A THRESHOLD PHENOMENON,
Texas Univ. at Austin. Dept. of Geological Sciences.
For primary bibliographic entry see Field 2J.
W75-07477

SEDIMENT IN IRRIGATION AND DRAINAGE WATERS AND SEDIMENT INPUTS AND OUTPUTS FOR TWO LARGE TRACTS IN SOUTHERN IDAHO,
Agricultural Research Service, Kimberly, Idaho. Snake River Conservation Research Center.
For primary bibliographic entry see Field 5G.
W75-07546

WATERSHED MANAGEMENT IN ARIZONA'S MIXED CONIFER FORESTS: THE STATUS OF OUR KNOWLEDGE,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 4C.
W75-07648

HYDROLOGICAL AND EROSION INFLUENCES OF SHELTERBELTS, (IN RUSSIAN),
G. P. Surmach.
Dokl Vses Ord Lenina Akad S-Kh Nauk Im V I Lenina, 3, p 28-29, 1973.

Descriptors: *Erosion control, Thawing, Flow characteristics.
Identifiers: Forest belts.

Quantitative characteristics of the flow of thawed water from plow-lands and arable lands in a zonal cut and characteristics of water absorption and anti-erosion activity of water belts are given. The necessity of a combination of forest belts and simple hydrotechnological systems is established.

New formulas for calculation of distances between additional water-regulatory forest belts are included.--Copyright 1974, Biological Abstracts, Inc.
W75-07651

A MODEL FOR PREDICTING EROSION AND SEDIMENT YIELD FROM SECONDARY FOREST ROAD CONSTRUCTION,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 4C.
W75-07653

RUNOFF AND EROSION AFTER BRUSH SUPPRESSION ON THE NATURAL DRAINAGE WATERSHEDS IN CENTRAL ARIZONA,
Arizona State Univ., Tempe.
For primary bibliographic entry see Field 3B.
W75-07655

SEDIMENT AND EROSION CONTROL DESIGN CRITERIA,
Maryland Dept. of Natural Resources, Annapolis. Water Resources Administration.
M. A. Ports.
In: The APWA Reporter, Vol 42, No 5, May 1975. p 18-19, 2 fig.

Descriptors: *Sediment control, *Sediment load, *Soil erosion, *Maryland, *Sediment yield, *Erosion control, Sedimentation rates, Erosion, Soil engineering, Soil investigations, Soil management, Soil surfaces, Surface runoff, Storm runoff, Drainage engineering, Agricultural engineering.
Identifiers: *Siltation.

In an effort to control erosion and sediment caused by human activity, the Maryland Legislature adopted, in 1970, the Statewide Sediment Control Law. All erosion and sediment control plans are considered on the basis of qualitative judgement of each plan's effectiveness. Since existing in-stream water quality standards for sediment loadings are unworkable during peak runoff periods, proposed design and analysis procedures must provide for calculation of the sediment yield prior to a rainstorm event. Because natural erosion rates range between 0.1 to 1.0 tons/acre/year, erosion rates below 1 ton/acre/year should not be considered to produce sediment pollution. With the use of watershed systems to protect water and land resources, sediment yields above 15 tons/acre/year should be established as sediment pollution for urban construction sites. It is recommended that sediment yields above 5 tons/acre/year be established as sediment pollution for agriculturally related activities. No attempt has been made to set criteria for construction directly within stream channels, lakes, tidal estuaries, or for the Atlantic Shoreline. The Universal Soil Loss Equation as developed by the USDA Agricultural Research Service provides a method for determining the combinations of control practices needed to meet the maximum allowable sediment yield. (Poertner)
W75-07672

LANDSCAPE TENDING AND NATURE CONSERVATION AS PARTIAL TASKS FOR SOCIALISTIC LAND DEVELOPMENT,
For primary bibliographic entry see Field 4A.
W75-07707

STUDIES ON SOIL EROSION CONTROL: 4. THE HYDRAULIC STUDIES OF WATER FLOW IN SLOPED LAND (IN JAPANESE),
Obihiro Zootechnical Univ. (Japan). Lab. of Agricultural and Civil Engineering.
For primary bibliographic entry see Field 4A.
W75-07756

THE MENDOTA WATERSHED PROJECT, LASALLE AND BUREAU COUNTIES, ILLINOIS (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Soil Conservation Service, Champaign, Ill.
Available from the National Technical Information Service, U.S. Dept. of Comerce, Springfield, Va. 22161, as EIS-IL-73-1834-F, $3.75 in paper copy, $2.25 in microfiche. November 26, 1973. 49 p, 3 map, 1 photo.

Descriptors: *Watershed Protect. and Flood Prev. Act, *Flood protection, *Channel improvement, Flood damage, Vegetation effects, Watershed management, Flood control, Floods, Land management, Retardance, Channels, Erosion, Runoff, Nutrients, Land use, *Illinois.
Identifiers: *Environmental Impact Statements, LaSalle County(Ill), Bureau Counties(Ill), *Mendota watershed(Ill).

The purpose of the project is watershed protection and flood prevention. The project will include land treatment measures supplemented by five floodwater retarding structures and 0.9 miles of channel modification. The environmental impact of the land treatment program will reduce average annual upland erosion by 40 percent, reduce runoff and nutrient losses, improve land use, and create public awareness of remaining flood hazards. Combined land treatment and structural measures will reduce overall flood damages 86.5 percent. Approximately 52 acres of water surface will provide the basis for an estimated 56,000 average annual visitor days of recreation. The main adverse effect is that the vegetative cover on 50 acres required for spoil areas, construction areas and areas required for temporary storage will be temporarily disturbed. Agricultural production on 119 acres will also be lost or diminished as a result of acquisition of land rights. Five alternatives were considered: land treatment only; two floodwater retarding structures; channel modification only; flood plain management and land treatment; and no project. The State of Illinois and the U.S. Army, Departments of Health, Education and Welfare, Interior, and Transportation, and the Environmental Protection Agency submitted comments. (Gagliardi-Florida)
W75-07785

UPPER SALT CREEK WATERSHED, COOK, LAKE AND DUPAGE COUNTIES, ILLINOIS (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Soil Conservation Service, Washington, D.C.
For primary bibliographic entry see Field 8A.
W75-07789

DOES CANOEING INCREASE STREAMBANK EROSION,
Forest Service (USDA), St. Paul, Minn. North Central Forest Experiment Station.
For primary bibliographic entry see Field 2J.
W75-07792

5. WATER QUALITY MANAGEMENT AND PROTECTION

5A. Identification Of Pollutants

REAGENTS FOR DETERMINATIONS OF TRACE IMPURITIES IN WATER, PHASE II,
Southern Illinois Univ., Carbondale. Dept. of Chemistry and Biochemistry.
A. L. Caskey, R. J. Antepenko, and J. C. L. Swan.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-241 516, $5.25 in paper copy, $2.25 in microfiche. Illinois Water Resources Center, Urbana, Research Report No. 100, April 1975. 110 p, 29 tab, 13 fig, 17 ref. OWRT A-049-ILL(1). 14-31-0001-3513.

Descriptors: *Trace elements, Analytical techniques, *Pollutant identification, *Nitrates, *Nitrites, Sulfonates, Research and development, Groundwater, *Spectrophotometry, Water analysis.
Identifiers: *Reagents.

Determinations of trace impurities in water are often complicated. Sensitive, specific, stable, water-soluble reagents are needed for rapid, spectrophotometric determinations of trace impurities in water. A new method for the determination of nitrate in water is described which uses zinc 1-naphthol-4-sulfonate, an easily prepared, readily purified, stable, water-soluble reagent; the reagent is much better than 1-napthol-4-sulfonic acid, which is satisfactory only under carefully controlled conditions. The same reagent, zinc 1-naphthol-4-sulfonate, also has been proposed for the rapid, specific, sensitive determination of nitrite in natural waters. Nitrite can be determined at ppm levels in the presence of several thousand fold excess of nitrate. The methods can be applied to such diverse systems as lakes where agricultural fertilizer run-off may be significant, to effluents from plants in the food-preparation industry, and to natural-water systems in highly mineralized areas. (See also W72-07354).
W75-07352

OSCILLOPOLAROGRAPHIC DETERMINATION OF CU(II), CD(II), PB(II), ZN(II), NI(II), MN(II) AND CR(VI) IN WASTE WATERS (IN ITALIAN),
Pavia Univ. (Italy). Istituto di Chimica Generale.
C. Bertoglio Riolo, T. Fulle Soldi, and G. Spini.
Ann Chim. Vol 62, No 11/12, p 730-739, 1972, English summary.

Descriptors: *Waste water, Analytical techniques, *Polarographic analysis, Cadmium, Chromium, Copper, Lead, Manganese, Nickel, Zinc, *Pollutant identification.
Identifiers: Absorption, Atomic, Oscillo polarographic analysis.

Experimental conditions were investigated for the determination of Cu(II), Cd(II), Pb(II), Zn(II), Ni(II), Mn(II) and Cr(VI) in waste waters by osscillographic polarography. For all of these elements, analytical sensitivity and precision of this method are reported. The influence of the most common agents which cause interference is also reported. Results are in good agreement with atomic absorption spectroscopic analysis and confirm that the oscillopolarography is a suitable and reliable method for routine determinations in waste water.--Copyright 1974, Biological Abstracts, Inc.
W75-07361

AMOUNTS AND HYDROLYSIS OF PYROPHOSPHATE AND TRIPOLYPHOSPHATE IN SEDIMENTS,
Missouri Univ., Columbia. Dept. of Agronomy.
D. C. Riego.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-241 698, $7.00 in paper copy, $2.25 in microfiche. PhD Dissertation, August 1974. 175 p, 31 fig, 9 tab, 150 ref, append. OWRT B-051-MO(2).

Descriptors: Chemistry, *Sediments, *Phosphates, *Hydrolysis, Fertilizers, Phosphorus, Phosphorus compounds, Water pollution sources, Analytical techniques, Soil chemistry, Soil chemical properties, Chemical analysis, Nutrients, Chemical wastes, Rivers.
Identifiers: Pyrophosphate, Tripolyphosphate.

A method to determine pyrophosphate (PP) and tripolyphosphate (TPP) in sediments was developed. The limit of detection was 0.5 microgram P/g sediment. Fourteen sediments were tested and the highest TPP found was 1.8 micrograms P/g sediment. Thirteen of the sediment sam-

ples contained less than 1 microgram P/g as TPP. Only 3 of 14 samples contained more than 1 microgram P/g as PP. The highest level of PP found in a sediment was 8.5 micrograms P/g from an animal waste lagoon. The rates of hydrolysis of TPP and PP in sediments were determined. The influence of temperature, biological activity, and pH on the rate of TPP and PP hydrolysis was investigated. The rate of TPP and PP hydrolysis increased with increasing temperature. TPP and PP were hydrolyzed faster in nonsterile sediment than in sediment which had been sterilized. The rate of PP hydrolysis increased as the pH was increased. (Sims-ISWS)
W75-07399

AUTOMATED ANALYSIS OF INDIVIDUAL REFRACTORY ORGANICS IN POLLUTED WATER,
Oak Ridge National Lab., Tenn.
W. W. Pitt, R. L. Jolley, and S. Katz.
For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, $1.75. Environmental Protection Agency report number, EPA-660/2-74-076, August 1974. 98 p, 32 fig, 17 tab, 17 ref. 16ACG 03. 14-12-833.

Descriptors: *Pollutant identification, *Sewage effluents, *Chromatography, *Organic compounds, *Chlorination, Water analysis, Water pollution, Pollutants, Municipal wastes, Carbohydrates, Analytical techniques, Separation techniques, Instrumentation, Chemical oxygen demand, Gas chromatography, Spectrometry, Photometry, Fluorometry, Ion exchange, Radioactive tracers, Chlorine, Sewage treatment, Waste water treatment.
Identifiers: High-resolution liquid chromatography, Primary effluent, Secondary effluent, Ultraviolet-absorbing constituents, Chlorine-containing organics, Oxidizable constituents, Cerate oxidimetry, Chlorine-36.

Residual organic compounds present in municipal sewage treatment plant effluents at microgram-per-liter levels were analyzed using high-resolution anion-exchange chromatography. Effluents were concentrated 50- to 3000-fold by vacuum evaporation and freeze-drying and then analyzed by liquid chromatographs capable of detecting uv-absorbing, oxidizable (with sulfatoceric acid), or carbohydrate constituents. Using techniques such as uv spectroscopy, gas chromatography, and mass spectrometry, 56 organic compounds were identified in primary effluent and 13 organic compounds in secondary effluent. Some of these constituents were quantified. Chromatographic procedures, coupled with radioactive tracer chlorination, were applied to the analysis of chlorinated primary and secondary effluents. More than 60 peaks containing chlorine were found, and specific chlorinated compounds were tentatively identified by cochromatography and quantified at the 0.5- to 4-microgram/liter level. A detector system for liquid chromatography based on cerate oxidimetry was adapted as a rapid, sensitive continuous monitor for measuring the COD of waters. The effects of column geometry and operating parameters on chromatographic resolution were studied. Two high-resolution, ion exchange chromatographs (UV-Analyzers) were constructed for U.S. Environmental Protection Agency research laboratories, and are being used in the analysis of treated sewage effluents and other polluted waters. (EPA)
W75-07404

INVESTIGATIONS ON CONCENTRATIONS, DISTRIBUTIONS, AND FATES OF HEAVY METAL WASTES IN PARTS OF LONG ISLAND SOUND,
Connecticut Univ., Groton. Marine Sciences Inst.
For primary bibliographic entry see Field 5B.
W75-07412

MARINE POLLUTION MONITORING: STRATEGIES FOR A NATIONAL PROGRAM,
Scripps Institution of Oceanography, La Jolla, Calif.
Marine Pollution Monitoring: Strategies for a National Program, Deliberations of a workshop held at Santa Catalina Marine Biological Laboratory of the University of Southern California Allan Hancock Foundation, October 25-28, 1972, 203 p. (NOAA 75030307).

Descriptors: *Monitoring, *Chemcontrol, *Analytical techniques, *Sea water, Marine animals, *Sampling, *Chemical analysis, Pollutants, Water pollution, Chemical wastes, Wastes, Heavy metals, *Pollutant identification, Control systems, Data collections, Data transmission, Measurement.
Identifiers: Marine pollution monitoring, Chemical identification, Marine organisms, Marine water, Transport paths, Analysis aids.

Twenty-six scientists assembled at Santa Catalina Marine Station under NOAA sponsorship to develop strategies for initiation of monitoring programs for chemical pollutants in the marine environment. Topics discussed include the sampling of marine waters, estuaries, marine organisms, and transport paths; analytical techniques for selected inorganic species, and selected organic compounds; and various aids to analysis of marine organisms for heavy content. Recommendations include the establishment of a national marine monitoring program for chemical pollution; establishment of a technical group in NOAA to plan and implement such a program; establishment of an advisory panel to recommend policies; and the convening of workships to consider all aspects of marine pollution monitoring. (NOAA)
W75-07418

APPLICATION OF X-RAY EMISSION SPECTROMETRY TO THE DETERMINATION OF MERCURY IN BIOLOGICAL SAMPLES,
National Inst. of Environmental Health Sciences, Research Triangle Park, N.C.
P. Walsh, P. Hamrick, and N. Underwood.
Rev Sci Instrum. Vol 44, No 8, p 1019-1020. 1973.

Descriptors: *X-ray spectroscopy, *Mercury, Blood, Kidneys, Urine, *Sampling, *Analytical techniques, X-ray analysis, *Pollutant identification.

The application of x-ray emission spectrometry to quantitative determination of mercury in biological samples is described. Mercury was measured in blood, water, kidney and urine. Matrix effects were detectable but not critical.--Copyright 1974, Biological Abstracts, Inc.
W75-07419

MICROCOMBUSTION METHOD FOR THE DETERMINATION OF CARBON-14-LABELED PESTICIDE RESIDUES IN SOIL,
Agricultural Research Service, Fort Collins, Colo.
W. E. Beard, and W. D. Guenzi.
Soil Science Society of America Proceedings, Vol 39, No 1, p 63-65, January-February 1975. 1 fig, 2 tab, 5 ref.

Descriptors: Pesticides, *Soil analysis, *Tagging, *Soil tests, *Analytical techniques, Carbon dioxide, Chemical analysis, Evaluation, Gas chromatography, Radioactivity techniques, Instrumentation, Testing, DDT, Analysis, Chemistry, Testing procedures, Solvent extractions, *Pesticide residues, *Pollutant identification.
Identifiers: *Carbon-14, *Microcombustion method, Nitrogen analyzers, Picloram, Lindane, Scintillation counting techniques, Degradation products.

A dry combustion procedure commonly used for total carbon analysis was modified and used to determine the concentration of C-14-labeled pesticides in soil. Modifications included replacement of the Ascarite CO2 trap with a solution of an organic base compatible with liquid scintillation solvents, and minor carrier gas flow changes. Recovery of three pesticides from four soils ranged from 83 to 99% and averaged 94%. (Henley-ISWS)
W75-07432

NITRATE MEASUREMENTS USING A SPECIFIC ION ELECTRODE IN PRESENCE OF NITRITE,
Oak Ridge National Lab., Tenn.
C. W. Francis, and C. D. Malone.
Soil Science Society of America Proceedings, Vol 39, No 1, p 150-151, January-February 1975. 2 fig, 1 tab, 9 ref.

Descriptors: *Nitrates, *Nitrogen compounds, *Analytical techniques, *Instrumentation, *Measurement, Inorganic compounds, Chemicals, Denitrification, Nitrites, Water quality, Colorimetry, Analysis, Estimating, Evaluation, Ions, Electrodes, *Pollutant identification.
Identifiers: *Sulfanilamide, *Nitrite interference, Nitrite complexing.

The presence of the nitrite anion NO2(-) may lead to a significant error in measuring NO3-N concentrations with a specific ion electrode. Interference by nitrite was eliminated by complexing the nitrite with sulfanilamide in 0.01 N H2SO4. In this manner, nitrate levels can be read directly in concentrations ranging from 10 to 5000 ppm NO3-N. The method is particularly useful in denitrification studies where HCO3(-) and CO3(--) anions as well as NO2(-) preclude direct NO3-N measurements. (Henley-ISWS)
W75-07433

EARTH RESISTIVITY SURVEYS - A METHOD FOR DEFINING GROUND-WATER CONTAMINATION,
Geraghty and Miller, Port Washington, N.Y.
For primary bibliographic entry see Field 5B.
W75-07440

THE LINEAR MEAN GRADIENT MODEL FOR TWO-PARTICLE TURBULENT DIFFUSION,
National Center for Atmospheric Research, Boulder, Colo.
M. L. Thiebaux.
Journal of the Atmospheric Sciences, Vol 32, No 1, p 92-101, January 1975. 9 ref.

Descriptors: *Air pollution, *Diffusion, *Model studies, Mathematics, *Statistics, Energy dissipation, Turbulent flow, Probability, Mixing, Dispersion, *Pollutant identification.
Identifiers: *Diffusivity tensor, Linear mean gradient model, Relative diffusivity.

A two-particle description of turbulent diffusion provides the information required to determine certain kinds of shape characteristics of cloud contaminants. The concept of scale-dependent relative diffusivity for the spreading of contaminant clouds is implicit in the two-particle description. The linear mean gradient model was applied to the diffusion of a pair of particles passively advected by an inhomogeneous, nonstationary ensemble of velocity fields. The central result was a differential equation satisfied by a model joint probability density function of the particle positions, approximating that of the real ensemble. Phenomenologically determined coefficients appeared in the equation. One of these was the one-particle effective eddy diffusivity tensor while the other was a tensor quantity representative of the correlation between the motions of the particles. Conditions on the tensor coefficients were found to ensure that the one-particle model was properly embedded in the two-particle model. The separation into a center-of-mass diffusion model and a relative diffusion model was accomplished. Corresponding diffusivi-

ty tensors were derived and specialized to the case of homogeneous turbulence. A method was suggested for determining the required diffusivity tensors from observations of the statistical properties of tracer trajectories. (Singh-ISWS)
W75-07444

A CONTINUOUS TURBIDITY MONITORING SYSTEM FOR COASTAL SURFACE WATERS,
Old Dominion Univ., Norfolk, Va. Inst. of Oceanography.
W. W. Berg, Jr., P. Fleischer, G. R. Freitag, and E. L. Bryant.
Limnology and Oceanography, Vol 20, No 1, p 137-141, January 1975. 4 fig, 4 ref.

Descriptors: *Turbidity, Water properties, *Monitoring, *On-site tests, *Water analysis, Instrumentation, Analytical techniques, Measurement, Physical properties, Optical properties, Turbidity currents, Water quality, Water, Testing, Opacity, Salinity, Data collections, Oceans, Coasts, Surface waters, Suspended solids.
Identifiers: *Turbidimeter, *Optical transmissometer, Particulate matter, Santa Barbara Channel, Chesapeake Bay.

A continuous, time-referenced turbidity monitoring system utilizes a keel mounted optical transmissometer with a modified strip chart recorder. It allows detailed study of the distribution of suspended particles in surface waters. (Henley-ISWS)
W75-07471

SUSPENDED MARINE CLAY MINERAL IDENTIFICATION BY SCANNING ELECTRON MICROSCOPY AND ENERGY-DISPERSIVE X-RAY ANALYSIS,
Texas A and M Univ., College Station. Dept. of Oceanography.
For primary bibliographic entry see Field 2J.
W75-07472

THE DETERMINATION OF AMMONIA IN SEA-WATER,
Marine Biological Association of the United Kingdom, Plymouth (England). Plymouth Lab.
For primary bibliographic entry see Field 2K.
W75-07474

THE PREVALENCE OF HUMAN DENTAL CARIES AND WATER-BORNE TRACE METALS,
Forsyth Dental Center, Boston, Mass.
R. L. Glass, K. J. Rothman, F. Espinal, H. Velez, and N. J. Smith.
Arch Oral Biol. Vol 18, No 9, p 1099-1104, 1973, Illus.

Descriptors: *South America, Human diseases, Water pollution, *Metals, Fluorides, *Trace elements, Water analysis, Calcium, Magnesium, Molybdenum, Copper, Iron, Vanadium, Spectroscopy, Pollutant identification, Public health, Potable water.
Identifiers: *Colombia, *Dental caries, Spectroscopic analysis.

Marked differences in the prevalence of dental caries were observed in 2 isolated villages in Colombia, South America. These differences approximate those observed between areas of minimal and optimal fluoride ingestion, although each village has less than 0.1 ppm fluoride in the drinking water. Dietary histories reveal remarkedly similar dietary practices. Samples of drinking water were collected from these villages, and analyzed by emission spectroscopy for the concentrations of 21 trace elements. In the case of 13 elements, concentrations were at or below the threshold of detection or showed minimal variability. Concentrations of Ca, Mg, Mo and V were higher in the water samples from the village with the low caries prevalence, while concentrations of Cu, Fe and Mg were higher in the samples from the village with the higher prevalence. These differences were highly significant. The caries prevalence in the high caries village was typical of the country as a whole.--Copyright 1974, Biological Abstracts, Inc.
W75-07479

TOXICITY OF THE FLESH OF COMMON FISH TO THE WHITE MOUSE (MUS MUSCULUS VAR. ALBA),
Poitiers Univ. (France). Laboratoire de Microbiologie et Biologie Maritime.
For primary bibliographic entry see Field 5C.
W75-07483

ENVIRONMENT SURVEYS,
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
For primary bibliographic entry see Field 7B.
W75-07503

CHEMISTRY IN THE AQUATIC ENVIRONMENT,
Victoria Ministry for Conservation, Melbourne (Australia). Westernport Bay Environmental Study.
M. A. Shapiro, and D. W. Connell.
Proceedings of the Royal Australian Chemical Institute, Vol 42, No 5, p 113 - 118, May 1975. 4 fig, 2 tab, 23 ref.

Descriptors: *Reviews, *Water quality, *Water analysis, *Aquatic environment, Water chemistry, Environmental control, Environmental effects, Sampling, Analytical techniques, *Pollutant identification, Water pollution, *Path of pollutants.

Chemical evaluations are basic to understanding and managing the aquatic environment; and in many investigations the chemist must work as part of an interdisciplinary team, at least to the extent that he is fully aware of the implications of his work in the broader field which includes physical, ecological and social aspects. A review of the role of the chemist in such studies is presented, with emphasis on three critical areas: clarification of the impact of various substances on aquatic ecology; determination of the manner of degradation and distribution of contaminants in an ecological context; and development of sensitive analytical techniques suitable for large numbers of samples. The definition of water 'quality' in environmental terms is of the utmost importance in attempts to develop targeted methodology to solve existing problems. (CSIRO)
W75-07524

COASTAL SALINITY RECONNAISSANCE AND MONITORING SYSTEM--SOUTH COAST OF PUERTO RICO,
Geological Survey of Puerto Rico, San Juan.
J. R. Diaz.
Open-file report 74-1, 1974. 28 p, 15 fig, 8 tab, 2 ref.

Descriptors: *Saline water intrusion, *Puerto Rico, *Groundwater, *Aquifers, Saline water-freshwater interfaces, Water quality, Sampling, Sea water, Coasts.

Sea-water intrusion and other salinity conditions in the alluvial aquifer in the coastal areas of Guanica, Guayanilla-Yauco, Tallaboa, Juana Diaz, and Jobos, Puerto Rico, are described. The criteria for the water classification consider the dissolved solids content and other quality-of-water factors of particular importance for the use of water for domestic, irrigation, and industrial purposes. An increase in chloride ion and other significant changes in the chemical composition of the water in the alluvial aquifer were considered reliable indications of salt-water intrusion into the aquifer. Active zones of sea-water intrusion were detected in the southwestern sections of the Guayanilla-Yauco and Tallaboa areas. This intrusion is caused by overpumping of wells and by the penetration of sea water through old streambed channels and open sea-water canals. Small areas subjected to possible salt-water intrusion were found around Boca Chica in the Juana Diaz area in the southwestern section of the Salinas fan in the Jobos area. (Knapp-USGS)
W75-07553

WATER QUALITY OF TAMPA BAY, FLORIDA: DRY-WEATHER CONDITIONS, JUNE 1971,
Geological Survey, Tallahassee, Fla.
C. R. Goodwin, J. S. Rosenshein, and D. M. Michaelis.
Open-file report FL 74026, 1974. 85 p, 2 fig, 10 tab, 4 ref.

Descriptors: *Bays, *Florida, *Water quality, *Sampling, *Data collections, Hydrologic data, Basic data collections, Water analysis, Estuaries, Water pollution.
Identifiers: *Tampa Bay(Florida).

Two intensive water-quality sampling efforts were made in Tampa Bay, Florida, during critical hydrologic conditions. One was made during June 1971, an exceptionally dry weather period; another was made in October 1971, a moderately wet-weather period. The bay also was sampled periodically at selected sites during the 3-year investigation. Samples were collected from parts of Tampa Bay in Hillsborough, Manatee, and Pinellas Counties covering about 350 square miles of the bay system. These sampling efforts were made to provide information necessary for calibration and verification of a digital computer model that accurately simulates hydrodynamic and water-quality conditions in the bay. In addition, many of the data were gathered to provide a wide range of benchmark water-quality information. This report contains, in tabular form, data on 48 parameters from water samples collected from 105 sites in Tampa Bay. (Knapp-USGS)
W75-07556

HYDROLOGIC RECORDS FOR LAKE COUNTY, FLORIDA, 1972-73,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 2E.
W75-07566

WATER RESOURCES DATA FOR GEORGIA, 1974.
Geological Survey, Doraville, Ga.
For primary bibliographic entry see Field 7C.
W75-07569

WATER-QUALITY STUDIES TODAY AND TOMORROW,
Geological Survey, Menlo Park, Calif.
J. D. Hem.
In: Hydrology and Water Resources in Arizona and the Southwest, Vol 3; Proceedings of the 1973 Meetings of the Arizona Section of American Water Resources Association and the Hydrology Section, Arizona Adademy of Science, May 4-5, 1973, Tucson, p 44-49, 1973.

Descriptors: *Water quality, *Instrumentation, *Water analysis, Automation, Path of pollutants, Data collections, Waste disposal, Waste disposal wells, Saline water, Measurement.

Development of better instruments for analysis and automation have greatly increased the available information on quality of water during the past decade. There remains a need for further research on relationships between dissolved material and the solids in contact with water in order to cope with existing or potential problems in water quality such as the extent to which lead from automobile

exhausts may contaminate water supplies, or the safety of disposal of toxic wastes into deep saline aquifers. (Knapp-USGS)
W75-07579

CHEMICAL QUALITY OF GROUND WATER IN HAWAII,
Geological Survey, Honolulu, Hawaii.
L. A. Swain.
Hawaii Division of Water and Land Development, Honolulu, Report R48, May 1973. 54 p, 5 fig, 12 plate, 2 tab, 24 ref, append.

Descriptors: *Water quality, *Hawaii, *Groundwater, Basic data collections, Hydrologic data, Water chemistry, Water pollution sources.

Groundwater quality is described for the five major islands of Hawaii. In general, the water quality of each island is a function of the environment and of man's activities. The environmental factors are rainfall, geology, and sea-water intrusion. Man's activities that affect quality are agricultural pumping and return irrigation water, industrial wastes, and domestic wastes. The purpose of the study was to identify present groundwater quality conditions, both natural and as affected by usage, to show readily identifiable changes in quality with time and usage, and to relate water-quality conditions to the development of groundwater supplies. (Knapp-USGS)
W75-07585

WATER-QUALITY RECONNAISSANCE OF SURFACE INFLOW TO UTAH LAKE,
Geological Survey, Salt Lake City, Utah.
J. C. Mundorff.
Utah Department of Natural Resources, Salt Lake City, Technical Publication No 46, 1974. 96 p, 16 fig, 3 plate, 20 tab, 35 ref.

Descriptors: *Water quality, *Utah, *Surface waters, Irrigation water, Lakes, Dissolved oxygen, Water chemistry, Water pollution sources, Sediment yield.
Identifiers: *Utah Lake(Utah).

Water-quality reconnaissance in the drainage basin of Utah Lake covered an area of about 2,180 square miles, mostly, in Wasatch and Utah Counties, Utah. Altitudes in the area range from about 4,490 to 11,943 feet and normal annual precipitation (1931-60) ranged from about 10 to 60 inches. Most of the water available for use within the study area is derived from snowmelt in sparsely populated areas at higher altitudes where water use is small. The Provo River and its tributaries upstream from Hailstone had dissolved-solids concentrations of less than 200 mg/litre. The flow of the Provo River downstream from Deer Creek Reservoir is largely regulated. Although a large part of the flow is diverted near the mouth of Provo Canyon during the irrigation season, the dissolved-solids concentration of the water that entered Utah Lake was nearly always between 200 and 300 mg/litre. The water available for irrigation from the Provo River at the canyon mouth had a low- or medium-salinity hazard and a low-sodium hazard. Dissolved-solids concentrations of inflow to Utah Lake from Spanish Fork kuring February 1971 to September 1972 ranged from about 270 mg/litre during high flow to 1,110 mg/litre during low flow. Dissolved-oxygen concentrations measured at the Provo River and Spanish Fork near or upstream from the canyon mouths ranged from about 9 to 11 mg/litre. At the Provo River near Provo and at Spanish Fork near Utah Lake, pronounced diurnal fluctuation in dissolved-oxygen concentrations (6.4-17.2 mg/litre for the Provo River and 5.4-14.8 mg/litre for Spanish Fork) resulted from greatly depleted flow and from dense algal growth in the reaches of depleted flow. (Knapp-USGS)
W75-07586

DETERMINATION OF SMALL QUANTITIES OF CARBON DIOXIDE IN NATURAL WATERS,
Nagoya Univ. (Japan). Water Research Lab.
K. Satake, Y. Saijo, and H. Tominaga.
Jap J Limnol, 16-20, 1972. Illus.

Descriptors: *Analytical techniques, *Chemical analysis, *Water analysis, *Fresh water, Benthos, Zooplankton, Microorganisms, *Carbon dioxide.

This technique is highly sensitive; concentrations of CO2 as low as 0.2 mg CO2-C/l are easily determined. It takes 4 min for the determination of each sample and only 1 ml of sample. This technique can be employed not only for CO2 measurement in 14C photosynthesis experiments, but can also be applied to many other ecological of physiological studies of aquatic organisms. In fresh water where the CO2 concentration is low, it is possible to determine the rate of photosynthesis and respiration by measuring CO2 concentration in situ or in light and dark bottles. Application can also be made to the study of respiration of individual or small groups of organisms such as benthos or zooplankton.--Copyright 1974, Biological Abstracts, Inc.
W75-07588

DISTRIBUTION AND PERSISTENCE OF 1,2-DIBROMO-3-CHLOROPROPANE IN SOIL AFTER APPLICATION BY INJECTION AND IN IRRIGATION WATER,
California Univ., Davis. Dept. of Nematology.
For primary bibliographic entry see Field 5B.
W75-07609

A DIVER-OPERATED DREDGE FOR COLLECTING QUANTITATIVE BENTHIC SAMPLES IN SOFT SEDIMENTS,
Rice Univ., Houston, Tex.
For primary bibliographic entry see Field 2J.
W75-07614

REVERSE OSMOSIS FOR SPACECRAFT WASH WATER RECYCLING, MEMBRANE COUPON AND MODULE EVALUATIONS,
McDonnell-Douglas Astronautics Co. West, Huntington Beach, Calif.
For primary bibliographic entry see Field 5D.
W75-07627

THE DETERMINATION OF NITRATE IN WATERS AT LOW PPM LEVELS BY AUTOMATIC DISCRETE-SAMPLE ANALYSIS,
Beckman Instruments, Inc., Irvine, Calif.
J. Ramirez-Munoz.
Analytica Chimica Acta, Vol 72, No 2, p 437-442, October 1974. 2 fig, 3 tab, 3 ref.

Descriptors: *Nitrates, *Pollutant identification, *Water analysis, *Analytical techniques, Laboratory equipment, Automatic control, *Ultraviolet radiation, Testing procedures, Water pollution sources, Chemical analysis, Operations, Equipment, Reliability, Performance.

The adaptation of the UV technique to an automatic discrete-sample system, the AMA-40 System (Beckman Automated Materials Analyzer), is described. Automatic handling of samples provides several advantages in the UV measurement, for example, rapid sample preparation (addition of reagents and dilution processes), elimination of personal errors in manual handling, and standardization of the whole process with identical conditions (which leads to improved precision). The operating conditions are discussed, and the experimental setup is illustrated. The addition of 0.25 molar HCl resulted in better repeatability in comparison with tests performed at higher acidity. Filtration is mandatory for turbid samples. The experimental setup is simple and can be programmed to provide a reading every minute. It is easily applicable to routine determinations of nitrate in water. In routine work only single readings/sample should be scheduled; for optimal accuracy, duplicate or triplicate readings are recommended for low nitrate concentrations. (Witt-IPC)
W75-07637

DEVELOPMENT OF A METHOD FOR THE EXTRACTION AND DETERMINATION OF NON-POLAR, DISSOLVED ORGANIC SUBSTANCES IN SEA WATER,
C. Osterroht.
Journal of Chromatography, Vol 101, No 2, p 289-298, December 18, 1974. 5 fig, 5 tab, 27 ref.

Descriptors: *Sea water, *Organic compounds, *Water analysis, *Pesticides, Analytical techniques, Adsorption, Laboratory equipment, Sampling, Testing procedures, Gas chromatography, DDT, DDE, Aldrin, Chlorinated hydrocarbon pesticides, *Pollutant identification, Water pollution sources, Polychlorinated biphenyls, *Separation techniques.
Identifiers: Lindane, Benzene hexachloride(Hexachlorocyclohexane), Dichlorodiphenyltrichloroethane, Dichlorodiphenyldichloroethylene, Pristane, 2-6-10-14-Tetramethylpentadecane, Phenanthrene, 2-Chlorobiphenyl, n-Hexadecane, Amberlite XAD.

A method for extracting sea water by sorption on Amberlite XAD is described. The apparatus, sampling technique, work-up procedure, and determination by gas chromatography are described. Recovery tests with DDT, DDE, lindane, aldrin, 2-chlorobiphenyl, phenanthrene, pristane, and n-hexadecane demonstrated the applicability of the method to non-polar substances. The recoveries were about 80%. Gas chromatograms of two samples are shown. (Witt-IPC)
W75-07650

THE EXTRACTION AND RECOVERY OF CHLORINATED INSECTICIDES AND POLYCHLORINATED BIPHENYLS FROM WATER USING POROUS POLYURETHANE FOAMS,
Bristol Univ. (England). Dept. of Inorganic Chemistry.
P. R. Musty, and G. Nickless.
Journal of Chromatography, Vol 100, No 1, p 83-93, November 13, 1974. 2 fig, 9 tab, 8 ref.

Descriptors: *Insecticides, *Polychlorinated biphenyls, *Water analysis, Analytical techniques, Adsorption, Pollutants, Water pollution sources, Trace elements, Water properties, Water quality, Organic compounds, Chromatography, Gas chromatography, Chemical analysis, *Pollutant identification, Water pollution, *Separation techniques.
Identifiers: *Polyurethane, Foam plastics.

Porous polyurethane foams were used for the extraction and recovery of chlorinated insecticides and polychlorinated biphenyls from water. One liter of tap water was doped at the ppb level and elution of the adsorbed compounds was complete with 50 ml of acetone and 100 ml of n-hexane. Quantitative recoveries were obtained for the thirteen insecticides used, at a water flow rate of 100 ml/min. The recoveries for polychlorinated biphenyls were 40-99% at 100 ml/min. The amount of methylene blue absorbed from aqueous solution by the foams was correlated with the efficiencies of six forms, of different surface areas and bulk densities, for adsorbing chlorinated insecticides and polychlorinated biphenyls from water. (Witt-IPC)
W75-07652

AUTOMATED ION-SELECTIVE ELECTRODE METHOD FOR DETERMINING FLUORIDE IN NATURAL WATERS,
Geological Survey, Denver, Colo.
D. E. Erdmann.

Environmental Science and Technology, Vol 9, No 3, p 252-253, March, 1975. 5 tab, 3 ref.

Descriptors: *Fluorides, *Water analysis, *Pollutant identification, Analytical techniques, Trace elements, Natural streams, Ions, Electrodes, Aluminum, Chemical analysis, Water chemistry, Water properties, Water quality, Halides, Inorganic compounds, Instrumentation.
Identifiers: AutoAnalyzer, *Ion selective electrode method.

An automated fluoride method which uses AutoAnalyzer modules in conjunction with a fluoride ion-selective electrode was evaluated. The results obtained on 38 natural water samples agreed well with those determined by a similar manual method (average difference 0.026 mg/liter). An average fluoride concentration of 0.496 mg/liter was found when several natural water samples were spiked with 0.50 mg/liter fluoride. Aluminum is the only significant interfering substance, and it can be easily tolerated if its concentration does not exceed 2 mg/liter. Thirty samples were analyzed/hour over a concentration range of 0-2 mg/liter. (Witt-IPC)
W75-07657

LIQUID CHROMATOGRAPHIC DETERMINATION OF NITROGLYCERIN PRODUCTS IN WASTE WATERS,
Radford Army Ammunition Plant, Va.
C. D. Chandler, G. R. Gibson, and W. T. Bolleter.
Journal of Chromatography, Vol 100, No 1, p 185-188, November 13, 1974. 3 fig, 9 ref.

Descriptors: *Chromatography, *Nitrates, *Water analysis, *Pollutant identification, *Waste water(Pollution), Nitrogen compounds, Analytical techniques, Chemical analysis, Water pollution sources, Pollutants, Inorganic compounds, Chemical wastes, Water quality, *Industrial wastes, Chemical industry, *Explosives, Laboratory equipment.
Identifiers: Glycerol nitrates.

A high-pressure liquid chromatographic procedure is described for the quantitative determination of nitrate esters such as trinitroglycerin (glycerol trinitrate). The technique is free from interference by inorganic or other organic nitrates that can cause error in the determination of trinitroglycerin by spectrophotometric or titrimetric methods. It is also more quantitative than the thin-layer chromatographic method, and the nitrate esters are not subject to thermal decomposition as in the gas chromatographic technique. Concentrations as low as 10 ppm of either tri- or dinitroglycerin in water samples were conveniently determined. The primary use of the procedure has been in the analysis of waste water samples from the trinitroglycerin purification process. The data show a high degree of sensitivity and specificity for the various nitrated compounds. (Witt-IPC)
W75-07659

MARINE ALGAL ASSAY PROCEDURE BOTTLE TEST,
Pacific Northwest Environmental Research Lab., Corvallis, Ore.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-239 709, $4.25 in paper copy, $2.25 in microfiche. Report EPA-660/3-75-006, December 1974. 43 p, 10 fig, 2 tab, 49 ref.

Descriptors: Eutrophication, Phytoplankton, *Bioassay, Phosphates, *Marine algae, Estuaries, *Pollutant identification, Estuarine environment, Nitrates, Nurtients, Limiting factors, Algae, Nitrogen compounds, Chlorophyta, Oceans, Salt tolerance, *Analytical techniques.
Identifiers: Algal assay procedure, *Dunaliella tertiolecta.

Described is protocol for a standardized primary producer nutrient bioassay for assessment of the effect of cultural eutrophication in estuarine and coastal marine areas. The green biflagellate unicellular alga Dunaliella tertiolecta Butcher (DUN clone) was selected as the bioassay organism because of its wide salinity tolerance, sensitivity to incremental additions and natural levels of critical or limiting nutrients, excellent replication and simple evaluation characteristics. (EPA)
W75-07686

HANDBOOK OF RADIOCHEMICAL ANALYTICAL METHODS,
National Environmental Research Center, Las Vegas, Nev. Technical Support Lab.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-240 621, $5.75 in paper copy, $2.25 in microfiche. Report EPA-680/4-75-001, February 1975. 140 p, 14 fig, F. B. Johns, editor.

Descriptors: *Chemical analysis, *Analytical techniques, *Radiochemical analysis, *Pollutant identification, *Radioactivity techniques, *Strontium radioisotopes.

This manual is a compilation of the chemical procedures used at the National Environmental Research Center-La Vegas for determining stable elements and radionuclides in environmental surveillance samples. It supersedes 'Southwestern Radiological Health Laboratory Handbook of Radiochemical Analytical Methods' published as Report No. SWRHL-11 in March 1970. The procedures in the current compilation are intended for use in processing relatively large numbers of samples in the shortest possible time for environmental radiological surveillance and, therefore, in some cases represent a compromise between precise analytical determination and adequate determination for surveillance purposes. For historical purposes, two methods for radiostrontium in milk are included since large numbers of samples were analyzed by these methods. An appendix provides instructions for preparing reagents listed for each method. It does not provide instructions for preparing solutions normally found in chemistry laboratories. (EPA)
W75-07697

PILOT SCALE TREATMENT OF WINE STILLAGE,
California State Dept. of Agriculture, San Francisco. Wine Advisory Board.
For primary bibliographic entry see Field 5D.
W75-07699

APPLICATION AND PROCUREMENT OF AUTOMATIC WASTEWATER SAMPLERS,
National Environmental Research Center, Cincinnati, Ohio.
R. P. Lauch.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-241 085, $3.75 in paper copy, $2.25 in microfiche. Report EPA-670/4-75-003, April 1975. 23 p, 1 tab, 25 ref. 1H327; ROAP 24ALE; Task 04

Descriptors: *Sampling, Water pollution, *Water sampling, *Automation, *Instrumentation, Water quality standards.
Identifiers: Water sampler application, Water sampler procurement, *Waste water samplers, Effluent sampler application, Automatic wastewater samplers.

Application and procurement of automatic sampling devices are discussed. Different sampler characteristics including compositing, proportionality, perservation, lift, and power are described. Manufacturers are listed. Application is discussed with reference to compliance with the National Pollutant Discharge Elimination System permit program, treatment plant control, and other uses. Method of selection and procurement (involving application, familiarization, and purchase) are discussed. (EPA)
W75-07702

PERFORMANCE OF THE ISCO MODEL 1391 WATER AND WASTEWATER SAMPLER,
National Environmental Research Center, Cincinnati, Ohio.
R. P. Lauch.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-240 700, $3.75 in paper copy, $2.25 in microfiche. Report EPA-670/4-75-001, February 1975. 30 p, 5 fig, 21 tab. 1HA327; ROAP 24ALE; Task 03.

Descriptors: Water pollution, *Water sampling, *Performance, Evaluation, *Instrumentation, On-site tests.
Identifiers: *Sampler evaluation, Sewer sampler evaluation, Effluent sampler evaluation, *Water sampler evaluation.

Performance of the ISCO model 1391 water sampler was tested. Tests were run at 2, 19, and 35C to check accuracy and precision of the timer, flowmeter, and sample volumes. The multiplexer function of delivering multiple aliquots per bottle was tested. Performance checks were made on both converter and battery power, and battery endurance was determined. Discrete sample temperatures were recorded versus time under iced conditions. Manufacturer's claims were mostly confirmed, but improvement is warranted for some sampler components. (EPA)
W75-07704

SEASONAL OCCURRENCE OF SEVERAL GROUPS OF HETEROTROPHIC BACTERIA IN TWO RESERVOIRS,
Caskoslovanska Adademie Ved, Prague. Hydrobiologicka Laborator.
V. Straskrabova.
Int Rev Gesamten Hydrobiol. Vol 59, No 1, p 9-16. 1974.

Descriptors: *Bacteria, *Reservoirs, *Seasonal, Isolation, *Pollution identification.
Identifiers: Acinetobacter, Aeromonas, Glucose, Pseudomonads.

Gram negative, asporogenous bacteria made up 75% of the strains isolated. Almost a half of them fermented glucose, which was probably caused by a selectivity of the agar medium for the particular types. The groups tentatively classified as Enterobacteriaceae and Aeromonas, prevailed during summer, whereas pseudomonads and Acinetobacter were more common in winter.--Copyright 1974, Biological Abstracts, Inc.
W75-07732

ISOLATION OF EDWARDSIELLA TARDA FROM AQUATIC ANIMAL SPECIES AND SURFACE WATERS IN FLORIDA,
Florida Univ., Gainesville. Dept. of Veterinary Science.
F. H. White, C. F. Simpson, and L. E. Williams, Jr.
J Wildl Dis. Vol 9, No 3, p 204-208. 1973.

Descriptors: *Enteric bacteria, Aquatic animals, Animal diseases, *Florida, Pollutant identification, Isolation.
Identifiers: *Edwardsiella-Tarda, Hemorrhagic euteritis.

E. tarda was isolated from lakes and streams in northcentral Florida. This emerging enteric bacterial pathogen also was isolated from alligators (Alligator mississippiensis) and brown pelicans (Pelecannus occidentalis carolinensis) on several occasions and from other species including the ring-billed gull (Larus delewarensis), bald eagle (Haliaeetus leucocephalus), great blue heron

(Ardea herodias), sandhill crane (Grus canadensis), common loon (Gavia immer) and largemouth bass (Micropterus salmoides). Hemorrhagic enteritis was found in association with E. tarda in some of the species presented.--Copyright 1974, Biological Abstracts, Inc.
W75-07735

THE ENUMERATION OF AEROBIC ACTINOMYCETES IN WATER SAMPLES, (IN FRENCH),
Institut Pasteur, Lille (France). Laboratoire d'Hydrobiologie.
C. Eak-Hour, and H. Leclerc.
Ann Microbiol (Paris). Vol 124, No 4, p 533-546. 1973 English Summary.

Descriptors: *Actinomycetes, *Aerobic bacteria, *Sampling, *Pollutant identification, Water sampling.

A practical method for the quantification of actinomycetes in water and in sediments was sought. A number of factors were investigated: suppression of bacteria and of fungi by the use of antibiotics, the purification, concentration and homogenization of samples and the comparative efficiency of different culture media. Techniques for different types of water samples are suggested.--Copyright 1974, Biological Abstracts, Inc.
W75-07740

EFFECT OF HYDROGEN ION CONCENTRATION ON THE DETERMINATION OF LEAD BY SOLVENT EXTRACTION AND ATOMIC ABSORPTION SPECTROPHOTOMETRY,
Purdue Univ., Lafayette, Ind., Dept. of Biochemistry.
R. J. Everson, and H. E. Parker.
Analytical Chemistry, Vol 46, No 13, p 1966-1970, November, 1974, 3 fig, 4 tab, 17 ref.

Descriptors: *Spectrophotometry, *Chelation, *Lead, *Solvent extractions, *Hydrogen ion concentration, Analytical techniques, Heavy metals, Testing procedures, Separation techniques, *Pollutant identification.
Identifiers: *Atomic absorption method.

The effect of hydrogen ion concentration on the chelating agents ammonium pyrrolidine carbodithioate (APCD) and sodium diethyldithiocarbamate (DDC) on the extraction of lead by these ligands, and on the stability of the lead chelates in the organic phase following extraction was studied. At low pH values, both chelating agents were decomposed, with APCD being the more stable. However, when the extraction of the lead chelate followed quickly after the addition of the chelating agent, there appeared to be little effect of pH on the extraction by APCD and effects on the DDC extraction only at pH values below 3. It appeared that APCD can extract lead quantitatively from pH 0.25 to 8.0 and DDC can above pH 3.25. Following extraction, the lead chelates appeared stable in the organic phase for at least one hour even though the pH of the aqueous phase varied from 2 to 8. (Pulliam-Vanderbilt)
W75-07793

COMPARISON OF ANALYTICAL TECHNIQUES FOR INORGANIC POLLUTANTS,
Laboratory of the Government Chemist, London (England).
R. F. Coleman.
Analytical Chemistry, Vol 46, No 12, p 989A-996A, October, 1974, 1 fig, 3 tab, 25 ref.

Descriptors: *Analytical techniques, *Testing procedures, Pollutants, Spectrophotometry, Microscopy, Electron microscopy, Mass spectrometry, X-ray spectroscopy, Neutron activation analysis, Electrochemistry, *Pollutant identification.

This paper discussed various analytical methods which are applied to inorganic pollutants found in food, water, or collected on air filters from the atmosphere. It aimed to provide some background data to assist in the selection of the appropriate technique for current and future problems. Advantages and disadvantages of various analytical methods and guides when to use each were discussed. Comparisons between the methods were also made. The methods considered were: Microscopy (optical and electron); atomic spectroscopy (flame and flameless A.A.S., atomic fluorescence, and atomic emission); mass spectrometry (spark and plasma source); x-ray spectrometry (wavelength and energy dispersive); neutron activation analysis; and electrochemical methods (anodic stripping voltammetry). (Pulliam-Vanderbilt)
W75-07794

REJECTION OF TRACE METALS FROM COAL DURING BENEFICIATION BY AGGLOMERATION,
National Research Council of Canada, Ottawa (Ontario). Div. of Chemistry.
C. E. Capes, A. E. McIlhinney, D. S. Russell, and A. F. Sirianni.
Environmental Science and Technology, Vol 8, No 1, p 35-38, January, 1974, 1 fig, 2 tab, 10 ref.

Descriptors: *Coals, *Heavy metals, *Electric powerplants, *Beneficiation, Separation techniques, Electric power costs, Mercury, *Pollutant identification, *Air pollution.
Identifiers: Oil agglomeration.

The rejection of trace quantities of heavy metals from coals during the process of fine grinding followed by selective oil agglomeration of the carbonaceous constituents was examined. Six different steam and coking coals, mainly from Canadian and U.S. sources, were treated. The level of most heavy elements was low but, in light of the large throughputs of power plants, the potential environmental hazard may be significant, especially for those elements which are volatile or may form volatile compounds when fired. Many of the trace metals were substantially removed during agglomerative beneficiation of the coal. Some which are apparently in organic association in the coal remained in the agglomerated product. Analytical methods used in the study were atomic absorption, optical emission spectroscopy, and spark source mass spectroscopy. Problems deriving from the ash content in untreated coals may be alleviated by such treatment. There is also the possibility of recovering appreciable amounts of metals with commercial value from the tailings. (Pulliam-Vanderbilt)
W75-07795

SYNTHESIS OF A SULPHONATED FERROIN REAGENT FOR CHELATING IRON (II) IN STRONG ACID SPECTROPHOTOMETRIC DETERMINATION OF THE OXIDATION STATE OF IRON IN SILICATES,
Australian National Univ., Canberra. Research School of Earth Sciences.
E. Kiss.
Analytica Chimica Acta, Vol 72, No 1, p 127-144, September, 1974. 3 fig, 3 tab, 25 ref.

Descriptors: *Analytical techniques, *Iron, *Spectrophotometry, *Rocks, *Heavy metals, Iron oxides, Chelation, Silicates, Mineralogy, Testing procedures, Soil tests, Pollutant identification.

The relatively easy accessibility of the ferroin chromogen 3-(4-phenyl-2-pyridyl)-5,6-diphenyl-1,2,4-triazine (PPDT) and its diammonium disulphonate derivative (PPDT-DAS) was described via an 8-step total synthesis. The extreme sensitivity and good selectivity of PPDT-DAS was comparable to terrosite. PPDT-DAS showed extreme resistance to thermal and oxidative degradation and also formed the tris-chelate with iron (II) ions in molar acid concentrations. Maximum color was formed in the pH range 3-8 with a molar absorptivity of 29,300 at 570m. Only fluoride (more than 500 ppm), EDTA, cyanide and comparable amounts of Cu(I) and Co(II) interfered. PPDT-DAS was successfully applied to the spectrophotometric microdetermination of mg quantities of Fe (II) oxide in silicate samples. The novel feature of this application was the simultaneous chelate formation with the release of Fe (II) from the silicate matrix in the cold by a solution of PPDT-DAS in hydrofluoric and sulphuric acids. Air oxidation problems were completely eliminated, but some resistant minerals were left largely undecomposed. More refractory materials were decomposed in PTFE bombs. (Pulliam-Vanderbilt)
W75-07796

METHYLMERCURY POISONING IN IRAQ,
Baghdad Univ. (Iraq).
For primary bibliographic entry see Field 5C.
W75-07797

DETERMINATION OF TRACE ELEMENTS IN COAL BY INSTRUMENTAL NEUTRON ACTIVATION ANALYSIS,
Ghent Rijksuniversiteit (Belgium). Instituut voor Nukleaire Wetenschappen.
C. Block, and R. Dams.
Analytica Chimica Acta, Vol 68, No 1, p 11-24, January, 1974, 9 tab, 2 fig, 13 ref.

Descriptors: *Trace elements, *Coals, *Analytical techniques, *Neutron activation analysis, Fossil fuels, Spectroscopy, Radioisotopes, Air pollution, Instrumentation, *Pollutant identification.

Neutron activation analysis by means of Ge (Li) gamma-spectrometry and computer-assisted data reduction is described for the simultaneous determination of 43 elements in coal samples in concentrations ranging from a few per cent down to 1 ppb. Its analytical possibilities are discussed. Two neutron irradiations and 3-5 gamma-spectrometric measurements were performed for each sample. The overall standard deviation for nearly all elements was determined by the counting statistics. (Jernigan-Vanderbilt)
W75-07799

FLUORIDE: GEOCHEMICAL AND ECOLOGICAL SIGNIFICANCE IN EAST AFRICAN WATERS AND SEDIMENTS,
Michigan Univ., Ann Arbor. Dept. of Zoology.
For primary bibliographic entry see Field 5B.
W75-07802

MICROBIOLOGICAL FOULING AND ITS CONTROL IN COASTAL WATER AND THE DEEP OCEAN,
Woods Hole Oceanographic Institution, Mass.
S. C. Dexter.
Technical Report WHOI-74-64, September 1974. 57 p. ONR H-83609-A, Amendment No. 3 and H-801 B.

Descriptors: *Fouling, *Toxicity, *Calibration, Water pollution control, Damages, Measurement, *Pollutant identification.
Identifiers: *Microbiological fouling, *Electron microscopy, Savonius rotor, Woods Hole(Mass), Sargasso Sea.

The rates of microfouling film formation on various toxic and nontoxic substrates exposed to natural sea water have been measured using scanning electron microscopy. Exposure conditions for the test samples ranged from four days in shallow coastal water at Woods Hole to over 400 days at depths to 5000 meters in the Sargasso Sea. The results are discussed in terms of the surface energy of the substrate, and are applied to the problem

of preventing the Savonius rotor speed sensor of oceanographic current meters from loss of calibration due to fouling. The conditions in terms of time and depth of exposure under which fouling preventative measures need to be undertaken are defined. Materials selection is discussed for a current meter to make near surface measurements under severe fouling conditions. (NOAA)
W75-07825

5B. Sources Of Pollution

NUTRIENT AND SEDIMENT PRODUCTION FROM FORESTED WATERSHEDS,
Nevada Agricultural Experiment Station, Reno.
J. Brown, W. Howe, and C. Skau.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-241 524, $3.75 in paper copy, $2.25 in microfiche. Cooperative Report Series Publication No. AG-1, 1973. 33 p, 1 fig, 10 tab, 49 ref, 3 append. ASAE Paper No. 73-201. OWRT A-043-NEV(1), and B-047-NEV(1).

Descriptors: *Nutrients, Sediments, *Land use, *Forest watersheds, Watersheds(Basins), *Water quality, Nitrogen, Nitrates, Dissolved solids, Suspended solids, Phosphates, *Sediment discharge, Correlation analysis, Regression analysis, Energy, Phosphorus, Water pollution sources.
Identifiers: *Lake Tahoe(Nev-Calif), *Truckee River(Nev-Calif), Orthophosphates.

An effort to determine and quantify relationships between drainage basin characteristics and certain water quality parameters is reported. Beginning August 1970, monthly concentrations of suspended sediments, nitrate nitrogen, organic nitrogen, and dissolved orthophosphate were determined for 25 forested watersheds of the Lake Tahoe-Truckee River System. Quantified watershed characteristics of soils, geology, geomorphology, vegetation, and land use for each watershed are assumed to act in combination to determine nutrient and sediment discharges from a drainage area. Correlation and regression analyses were used to test this assumption. Suspended sediment production is largely dependent upon two criteria: (1) sources of sediment and (2) energy to move it. Energy is evidently more important in this region, with overland slope and stream discharge dominating the relationship. Nitrogen production exhibits excessive seasonal variability and is apparently determined by watershed characteristics which reflect sources of nitrogen and influence of watershed drainage patterns throughout the year. Phosphorus production, on the other hand, is much more uniform and is primarily determined by factors affecting base flow relations, regardless of season. (Schulke-Nevada)
W75-07353

ENVIRONMENTAL QUALITY AND SAFETY, VOL. 2. GLOBAL ASPECTS OF CHEMISTRY, TOXICOLOGY AND TECHNOLOGY AS APPLIED TO THE ENVIRONMENT.
For primary bibliographic entry see Field 6G.
W75-07355

EFFECT OF SOIL ENRICHMENT WITH MINERAL ELEMENTS AND FERTILIZERS ON SURFACE WATER AND PLANTS,
Ghent Rijksuniversiteit (Belgium). Faculteit Landbouwwetenschappen.
A. Cottenie.
Qual Plant Mater Veg. Vol 22, No 1, p 37-53, 1972.

Descriptors: *Surface waters, *Vegetation, Pollutants, *Soil amendments, *Fertilizers, *Water pollution sources, Soil treatment, Nutrients.
Identifiers: *Mineral elements, Soil enrichment.

Observations indicate that intensive use of solid fertilizers may result in a certain accumulation of nutrient elements in the soil and an enrichment of soil water with these elements. This type of contamination, however, is less important than soil and plant pollution with external sources of trace elements, which can lead to toxic accumulations in plants and yield depressions. An accurate identification of such situation is possible using simple pot experiment techniques. The most effective way for immobilizing an excess of unwanted trace elements in light textured soils, is a consistant increase of soil pH by liming.--Copyright 1974, Biological Abstracts, Inc.
W75-07368

SOME CHEMICAL OBSERVATIONS ON THE UPPER SALT RIVER AND ITS TRIBUTARIES,
Arizona State Univ., Tempe.
For primary bibliographic entry see Field 2K.
W75-07369

A GENERAL LINEAR APPROACH TO STREAM WATER QUALITY MODELING,
IBM Federal Systems Div., Gaithersburg, Md.
M. Arbabi, and J. Elzinga.
Water Resources Research, Vol 11, No 2, p 191-196, April 1975. 1 fig, 3 tab, 20 equ, 14 ref.

Descriptors: *Water quality control, *Streams, *Linear programming, Standards, Dissolved oxygen, Biochemical oxygen demand, Optimization, Reach(Streams), Costs, Methodology, Mathematical models, Systems analysis, Model studies.
Identifiers: *Linear constraints, Constraint elimination, Balance equations, Relaxation technique, Willamette River(Oregon).

The problem of meeting stream dissolved oxygen standards while optimizing some objective is considered. New properties of the oxygen sag equation allow the constraint set of such mathematical programs to be described to a high degree of accuracy by linear inequalities; except for upper and lower bounds on pollutant discharges, three linear constraints at most are required per reach. Constraint elimination techniques are developed that can further reduce the number of constraints necessary. As a means of highlighting the potential power of these techniques to large-scale models, they are applied to the Willamette River in Oregon and Liebman's seven-reach example. A further reduction in the size of the mathematical program to be solved can be realized by employing the technique of relaxation. This technique, coupled with constraint elimination, should allow the efficient solution of large water quality problems. (Bell-Cornell)
W75-07382

WATER QUALITY MODELING BY MONTE CARLO SIMULATION,
Maine Univ., Orono. Dept. of Civil Engineering.
W. F. Brutsaert.
Water Resources Bulletin, Vol 11, No 2, p 229-236, April 1975. 6 fig, 1 tab, 10 equ, 4 ref.

Descriptors: *Water quality control, *Simulation analysis, *Monte Carlo method, *Stochastic processes, *Probability, Streams, Equations, Biochemical oxygen demand, Dissolved oxygen, Mathematical models, Systems analysis, Optimum development plans, Design, Wastes.
Identifiers: *Streeter-Phelps model, Frequency distributions, Triangular probability density function, Confidence level.

The applicability of Monte Carlo simulation to water quality modeling is demonstrated using a simple Streeter-Phelps model. The model accounts for the stochasticity of the input parameters. Triangular probability density functions are shown to be useful in case insufficient information is available to define meaningful frequency distributions of input parameters. The model output is presented as probability distributions of stream quality parameters. To demonstrate the usefulness of the technique, a simple, critical DO-deficit problem is set up. The technique is applicable to optimizing design and operation of wastewater treatment systems. (Bell-Cornell)
W75-07386

STOCHASTIC WATER QUALITY CONTROL BY SIMULATION,
Texas Univ., San Antonio. Div. of Environmental Studies.
C. S. Shih.
Water Resources Bulletin, Vol 11, No 2, p 256-266, April 1975. 5 fig, 6 tab, 6 equ, 11 ref.

Descriptors: *Water quality control, *Stochastic processes, *Simulation analysis, *Reliability, *River basins, *Management, Probability, Computers, Optimization, Water policy, Standards, Regional analysis, Return flow, Effluents, Treatment facilities, Streams, Decision making, Biochemical oxygen demand, Dissolved oxygen, Costs, Systems analysis, Equations, Mathematical models, *Texas.
Identifiers: Chance-constrained quadratic programming, Sensitivity, *San Antonio River basin(Tex).

In order to handle the probabilistic nature of treated waste effluent characteristics, the reliability associated with a basin-wide quality management goal has been included in the modeling process. Meanwhile, the quantitative and qualitative variations of the irrigation return flows and the urban runoff also exhibit a probabilistic nature in terms of both temporal and spatial measurements. Computer simulation has been utilized in analyzing the reliability and sensitivity of a river basin quality management. A simulation-optimization scheme for the determination of policies in regional water quality management has been developed subject to specific water quality standards. Stochastic quadratic programming techniques were used in the optimization analysis, the objective function consisting of minimizing a convex quadratic cost function including the operating cost, the amortization of capital expenditures and maintenance costs. A series of simulation models describing the statistical water quality control phenomena was developed. Meanwhile, a simulation analysis for the description of the probabilistic nature of the stream quality was developed for the control strategies of the return flows in the regional management system. As an illustration of the applicability of this water quality control approach, the major wastewater treatment facilities in the San Antonio River basin were analyzed. The sensitivity analysis was conducted to assess the most satisfying strategies for a regional water quality management system subject to probabilistic standards. (Bell-Cornell)
W75-07389

FLOW PATTERNS OF RAINWATER THROUGH SLOPING SOIL SURFACE LAYERS AND THE MOVEMENT OF NUTRIENTS BY RUNOFF,
Iowa State Univ., Ames. Dept. of Agronomy.
N. L. Powell, and D. Kirkham.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-241 713, $3.75 in paper copy, $2.25 in microfiche. Completion Report No. 64, Iowa State Water Resources Research Institute, Ames, October 1974. 45 p, 10 fig, 2 tab, 40 ref. OWRT A-044-IA(4). 14-31-0001-4015, 14-31-0001-3515, 14-31-0001-3015.

Descriptors: *Runoff, *Groundwater movement, Slopes, Rainfall-runoff relationships, *Saturated flow, Fertilizers, Flow, Water pollution sources, *Nitrates, Nutrients, *Path of pollutants, Model studies, Seepage, *Flow nets, Tile drains.
Identifiers: LaPlace's Equation Solutions.

A modified Gram-Schmidt method gave the mathematical solution for two boundary value problems of agricultural drainage in saturated, sloped soil bedding. In the first problem, seepage

patterns of rainfall flowing through the bedding to a tile drain on a barrier were found. In the second problem, seepage patterns of rainfall through soil underlain by a barrier at great depth, with no tile drain, were found. Solutions were obtained by solving LaPlace's equation subject to boundary conditions. Flow nets and other flow characteristics were determined. For the first problem, 16 to 100 percent of the minimum saturating rainfall passed through the medium to the tile. For the second problem, 13 to 77 percent of the minimum saturating rainfall flowed into the medium above a critical point on the surface and out of the medium below the critical point. Several geometries were investigated. Laboratory studies with a sand tank model showed agreement between calculated streamlines and dye streaks. In the same model packed with soil, nitrate solutions were injected into the soil both above and below the critical point. At regular intervals, the runoff water was analyzed for nitrate. Nitrate injection upslope gave lower concentrations but the runoff contained nitrate for a longer time.
W75-07395

SOIL MOISTURE TRANSPORT IN ARID SITE VADOSE ZONES,
Atlantic Richfield Hanford Company, Richland, Wash. Research Dept.
R. E. Isaacson, L. E. Brownell, and J. C. Hanson.
October, 1974. 95 p, 32 fig, 9 tab, 39 ref, 6 append. AEC AT(45-1)-2130.

Descriptors: *Radioactive waste disposal, *Nuclear wastes, *Radioactive wastes, *Water pollution sources, *Arid lands, *Soil contamination, *Washington, Water table, Soil dynamics, Soil water, Vadose water, Percolation, Soil moisture, Columbia River, Groundwater.
Identifiers: Richland(Wash), Vadose zones.

Radioactive wastes have been buried in backfilled trenches at the Hanford site. Whether or not the aridity of this site will prevent the wastes from percolating to the water table has been questioned. An analysis of the physical processes that affect the rate and direction of moisture movement in the vadose zone of the dry soils at Hanford is described. The depth of penetration of meteoric precipitation has been determined by profiling fallout tritium at two locations where the water table is about 90 meters below ground surface. In situ temperatures and water potentials were measured with temperature transducers and thermocouple psychrometers at one of these locations to obtain thermodynamic data for identifying the factors influencing soil-moisture transport. Neutron probes are being used to monitor soil moisture changes in two lysimeters, three meters in diameter by 20 meters deep. The lysimeters are also equipped to measure pressure, temperature, and water potential as a function of depth and time. Nonisothermal soil moisture transport processes are being studied. A thermal pump that moves water towards the surface exists as a result of annual sinusoidal oscillation of temperature in the upper nine meters of soil. A partially desiccated zone exists at a depth between 9 to 16 meters. (Bowden-Arizona)
W75-07403

REPORT TO THE CONGRESS ON OCEAN POLLUTION, OVERFISHING, AND OFFSHORE DEVELOPMENT; JULY 1973 THROUGH JUNE 1974.
National Oceanic and Atmospheric Administration, Washington, D.C.
Available from Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, for $1.45. Report to Congress on Ocean Pollution, Overfishing, and Offshore Development; July 1973 through June 1974, issued January 1975. 77 p, 10 fig, 3 tab, 2 append. (NOAA 75040305). PL 92-532.

Descriptors: *Oceans, *Water pollution, *Water pollution sources, *Oil pollution, *Environmental effects, *Environmental control, Pollutants, Pollution abatement, Oil spills, Oil wastes, Waste water(Pollution), Chemical wastes, Animal physiology, Genetics, Fish conservation, Fish management, Fish harvest, Fishing, Fisheries, Commercial fishing.
Identifiers: Marine pollution, Marine pollution research, Overfishing, Offshore development, Petroleum hydrocarbons, Synthetic hydrocarbons, Offshore deepwater ports, Offshore powerplants, Ocean mining, Offshore oil development, Offshore gas development.

Accomplishments and other aspects of U.S. marine research efforts directed at long-range effects of pollution, overfishing, and other man-induced changes of ocean ecosystems are described in this annual report to Congress. Areas addressed include research activities of the government and private sector concerning marine pollution by petroleum hydrocarbons, heavy metals, and synthetic hydrocarbons; offshore development (deepwater ports, powerplants, ocean mining, and oil and gas development); regional studies on marine pollution; and various overfishing developments. (NOAA)
W75-07405

A BIBLIOGRAPHY OF NUMERICAL MODELS FOR TIDAL RIVERS, ESTUARIES AND COASTAL WATERS,
Rhode Island Univ., Kingston. Dept. of Ocean Engineering.
For primary bibliographic entry see Field 2L.
W75-07409

INVESTIGATIONS ON CONCENTRATIONS, DISTRIBUTIONS, AND FATES OF HEAVY METAL WASTES IN PARTS OF LONG ISLAND SOUND,
Connecticut Univ., Groton. Marine Sciences Inst.
P. Dehlinger, W. F. Fitzgerald, D. F. Paskausky, R. W. Garvine, and W. F. Bohlen.
Marine Sciences Institute Final Report, October 1974. 161 p, 36 fig, 31 tab, 78 ref, 2 append. (NOAA-74121601).

Descriptors: *Water pollution, *Waste disposal, *Estuaries, *Sounds, *Oysters, *Metals, Coasts, Zinc, Copper, Mercury, Manganese, Nickel, Water circulation, Cadmium, Pollutants, Connecticut, New York.
Identifiers: Data(Tables), *New York Bight, *Long Island Sound, Heavy metal wastes, Flushing.

A two-year investigation was conducted on heavy metal wastes in Long Island Sound, with emphasis on the eastern Sound and the Connecticut coast. The program consisted of five integrated projects with the ultimate objective being to determine a preliminary budget of these wastes. The projects were concerned with the concentrations, distributions, and fates of heavy metals in the water column, water circulation patterns and water renewal times in the Sound, the structure and outflow of the Connecticut River into the Sound, the transport of suspended materials in the Sound, and the uptake of metals in oysters at various locations along the Connecticut coast. The names of the projects are as follows: Heavy Metal Wastes in Eastern Long Island Sound--Trace Metal Speciation; Circulation and Renewal of Waters in Eastern L.I.S.; Connecticut River Discharge in L.I.S.; Suspended Material Transport in Eastern L.I.S.; and Determinations of Heavy Metals in Shellfish in L.I.S. (NOAA)
W75-07412

TOXAPHENE INTERACTIONS IN ESTUARINE ECOSYSTEMS,
Georgia Univ., Savannah. Marine Extension Center.
For primary bibliographic entry see Field 5C.
W75-07414

RECONNAISSANCE OF BOTTOM SEDIMENTS ON THE INNER AND CENTRAL NEW JERSEY SHELF (MESA DATA REPORT),
National Oceanic and Atmospheric Administration, Boulder, Colo. Marine Ecosystems Analysis Program.
For primary bibliographic entry see Field 2L.
W75-07425

CHANGE IN THE PHYSIOCOCHEMICAL COMPOSITION OF WATER UNDER THE EFFECT OF FELLINGS,
Severo-Kavkazskaya Lesnaya Opytnaya Stantsiya, Maykop (USSR).
A. A. Drobikov.
Soviet Hydrology, Selected Papers No. 3, p 267-273, 1973, 4 tab, 11 ref. Translated from Forestry (Lesovedeniye), No. 3, p 3-9, 1973.

Descriptors: *Water quality, *Forest management, Rivers, *Water pollution sources, Watersheds(Basins), *Lumbering, Physicochemical properties, Chemical properties, Biological properties, Water pollution, Cutting management, Forests, Water temperature, Biochemical oxygen demand, Coliforms, Dissolved oxygen, Chlorides, Ammonia, Sulfates, Suspended solids, *Clear-cutting.
Identifiers: USSR.

The change in some physiocochemical characteristics of river water and in the number of microorganisms in it under the effect of forest felling, discharge, and seasons was examined. It was established that the strongest creek pollution occurs when the water crosses a clear-cut area. Selective group cuttings reduced to a minimum the negative effects of felling on river water quality. Seasonal (winter and summer) physicochemical property values were tabulated for the runoff after passing through a clear-cut area, a gradually cut area, a selectively group-cut area, and virgin forests. The investigations were performed in three drainage basins ranging in size from 5.3 to 5.7 hectares. (Humphreys-ISWS)
W75-07429

EARTH RESISTIVITY SURVEYS - A METHOD FOR DEFINING GROUND-WATER CONTAMINATION,
Geraghty and Miller, Port Washington, N.Y.
R. L. Stollar, and P. Roux.
Ground Water, Vol 13, No 2, p 145-150, March-April 1975. 4 fig, 10 ref.

Descriptors: *Groundwater, *Water pollution, *Electrical resistance, *Pollutant identification, *Conductivity, On-site investigations, Water pollution sources, Resistivity, Pollutants, Groundwater movement.
Identifiers: Case histories, *Pollution plume, Specific conductance.

An important part of every investigation of groundwater pollution is to locate and define the extent of the contaminated body of groundwater. Because earth resistivity is inversely proportional to groundwater conductivity, the location of groundwater that has been contaminated by a relatively high concentration of conductive industrial wastes, for example, may be quickly and accurately traced. For the resistivity method to give useful results, resistivity contrasts must exist in the subsurface. For example, if the contaminant does not have a significantly greater conductivity than the natural groundwater, the method may not work. In addition, if depth to water is too great, the thickness of the unsaturated sediments can mask any contrasts between contaminated and natural groundwater. The geologic environment must be relatively uniform so that the resistivity values and profiles can be compared with one another. Four case histories of industrial and landfill sites were discussed. The areas underlain by the contaminated groundwater bodies ranged from 25 to 100 acres. The depths to the contaminated water

were relatively shallow, ranging from 5 to about 60 feet below land surface. In three of the cases, the results of the earth resistivity studies, which were verified by installing test wells in and around the area being investigated, proved to be remarkably accurate. In the fourth study, the conditions mentioned were not met, and the survey was unsuccessful. (Prickett-ISWS)
W75-07440

INVESTIGATION AND REHABILITATION OF A BRINE-CONTAMINATED AQUIFER,
Engineering Enterprises, Inc., Norman, Okla.
J. S. Fryberger.
Ground Water, Vol 13, No 2, p 155-160, March-April 1975. 4 fig, 1 tab, 7 ref.

Descriptors: *Groundwater, *Water pollution, *Oil fields, *Brines, *Rehabilitation, Pollution abatement, Cost-benefit analysis, Brine disposal, Economics, Alluvial aquifers, Disposal fields, Cost analysis, Decision making, Investigations, Saline water intrustion, *Arkansas, Ponds, Disposal, Waste water(Pollution).
Identifiers: *Evaporation pits, *Disposal pits.

Faulty disposal of oil field brine through an 'evaporation' pit and later through a faulty disposal well resulted in the contamination of one square mile of an alluvial aquifer in southwestern Arkansas. The physical parameters of the contamination were defined, and some of the chemical changes that occur as the brine moved through the aquifer were explained. In addition, alternate methods of aquifer rehabilitation were explored, and the costs of rehabilitation were compared with potential benefits. It was concluded that rehabilitation is not now economically justified. (Prickett-ISWS)
W75-07441

THIRTY-FIVE YEARS OF CONTINUOUS DISCHARGE OF SECONDARY TREATED EFFLUENT ONTO SAND BEDS,
Rensselaer Polytechnic Inst., Troy, N.Y. Dept. of Environmental Engineering.
D. B. Aulenbach, and T. J. Tofflemire.
Ground Water, Vol 13, No 2, p 161-166, March-April 1975. 6 fig, 1 tab, 5 ref.

Descriptors: *Groundwater, *Water pollution, *Sewage effluents, *Sewage treatment, *Aerobic treatment, Nitrates, Phosphates, Trickling filters, Sands, Wells, *New York.
Identifiers: *Lake George Village(NY).

The Lake George Village sewage treatment plant has been discharging trickling filter effluent onto natural delta sand beds for 35 years. The applied sewage apparently appears near the banks of West Brook approximately 600 m from the lower sand beds. Wells were placed between the recharge beds and the appearance of the seepage at West Brook. The quality of the water in the wells was evaluated for slightly over one year. The groundwater appeared to be aerobic at all times indicating that the oxygen demand of the applied effluent was adequately reduced before it reached the groundwater. This should afford adequate and proper tertiary treatment for the applied effluent. The phosphorus concentration was significantly reduced at the first well downstream (groundwater) approximately 150 m from the sand beds. The phosphorus in well 2 approximately 600 m from the lower sand beds reached a high value of 150 micrograms/liter during the late fall but was less than 100 micrograms/liter during the rest of the year. Some of the nitrogen in the applied effluent was apparently oxidized to nitrate which was very little removed by the sand system. The highest nitrate concentration found was 14 mg N/l in well 3C during spring, whereas well 3A had almost consistently the lowest concentration of nitrate. (Gibb-ISWS)
W75-07442

THE CONFIGURATION OF CONTAMINATION ENCLAVES FROM REFUSE DISPOSAL SITES ON FLOODPLAINS,
Iowa State Univ., Ames. Dept. of Earth Sciences.
R. Palmquist, and L. V. A. Sendlein.
Ground Water, Vol 13, No 2, p 167-181, March-April 1975. 12 fig, 6 tab, 15 ref.

Descriptors: *Groundwater, Water pollution, Wastes, *Water pollution sources, *Water pollution control, Subsurface flow, Leachate, *Path of pollutants, Wells, *Iowa, Hydrogeology, Monitoring, Water quality.
Identifiers: *Contamination enclaves, Malenclaves.

The theoretical shape of a zone of contaminated groundwater (an enclave) can be predicted from a knowledge of the three-dimensional, groundwater flow pattern. The reasoning in other investigators suggests that the horizontal shape of the enclave is a flame-like plume extending from the source, parallel to the groundwater flow lines, in a downflow direction. According to LeGrand, the ultimate size of the enclave will depend upon the relative rates of decay, diffusion, dilution, and absorption of the contaminants. Similar reasoning suggests that, in vertical section, the boundaries of the enclave will follow the groundwater flow lines between contamination source and groundwater discharge site. This reasoning suggests that the three-dimensional shape of an enclave is that of a tongue-like lobe, the length, width, and depth of which increases with increasing distance from and increasing height above the discharge site. Studies made in Iowa indicate that the size and shape of the contamination enclave resulting from refuse disposal sites can be predicted from the initial geohydrologic conditions and that it may become possible to estimate the concentrations within the enclave at any point in time and space. These possibilities open the way toward a strategy of minimizing potential contamination of aquifers through selective refuse site placement on the floodplain. (Gibb-ISWS)
W75-07443

HUMIC MATTER IN NATURAL WATERS AND SEDIMENTS,
Fisheries Research Board of Canada, Winnipeg (Manitoba). Freshwater Inst.
T. A. Jackson.
Soil Science, Vol 119, No 1, p 56-64, January 1975. 78 ref.

Descriptors: *Humus, *Freshwater, *Sea water, *Sediments, *Organic matter, Chemical properties, Podzols, Aquatic life, Soils, Ecology, Geology, Economics.

The natural hisotory of aquatic and sedimentary humic substances in both marine and freshwater environments was reviewed. The ecological, geological, and economic importance of these compounds was discussed, and attention was drawn to problems requiring further research. The humic matter of natural waters and sediments is partly allochthonous (leached or eroded from soil and transported to lakes and oceans by streams and groundwater) and partly autochthonous (formed from the cellular constituents and exudates of indigeneous aquatic organisms). The highest proportions of allochthonous material occur in certain inland waters and coastal marine environments. Indigenous aquatic humic substances are essentially similar to the humic substances of soils, but tend to exhibit characteristic differences owing to the differences in source material and environment of formation. In general, the character of humic matter varies with the biological source material. The abundance and nature of humic substances in natural waters and sediments show marked geographical variability. The humic matter of ocean water is concentrated in coastal regions, especially near the mouths of rivers. One of the principal reasons for the geochemical and economic importance of humification is that the process causes the carbon and nitrogen of biochemical compounds to be partially shunted into relatively inert humic substances instead of being completely mineralized and recycled. As in soil, the beneficial effects of humic matter in aquatic systems can probably be ascribed largely to its metal-binding and cation-exchange properties. (Sims-ISWS)
W75-07453

WATER LEVEL FLUCTUATIONS DUE TO EARTH TIDES IN A WELL PUMPING FROM SLIGHTLY FRACTURED CRYSTALLINE ROCK,
Du Pont de Nemours (E.I.) and Co., Aiken, S.C. Savannah River Lab.
I. W. Marine.
Water Resources Research , Vol 11, No 1, p 165-173, February 1975. 10 fig, 1 tab, 16 ref. AEC Contract AT(07-2)-1.

Descriptors: *Radioactive wastes, *Radioactive waste disposal, *Water level fluctuations, *Tides, Wells, Permeability, Porosity, Transmissivity, Storage coefficient, Pump testing, Aquifer testing, Barometric efficiency, Metamorphic rocks, Crystalline rocks, Gravity, Coastal plains, Sediments, Injection, *South Carolina.
Identifiers: *Earth tides, Triassic basin(Buried), Packer tests, Elastic moduli, Specific storage, Barometric fluctuations.

At the Savannah River plant of the Atomic Energy Commission near Aiken, South Carolina, there are three distinct groundwater systems: the coastal plain sediments, the crystalline metamorphic rocks, and a buried Triassic basin. The coastal plain sediments include several Cretaceous and Tertiary granular aquifers and aquicludes, the total thickness being about 305 m. Below these sediments, water occurs in small fractures in crystalline metamorphic rock. Water level fluctuations due to earth tides were recorded in the crystalline metamorphic rock system and in the coastal plain sediments. No water level fluctuations due to earth tides were observed in wells in the Triassic rock because of the very low permeability. The water level fluctuations due to earth tides in the crystalline rock were about 10 cm, and those in the sediments were about 1.8 cm. The use of water level fluctuations due to earth tides to calculate porosity appeared to present practical difficulties both in the crystalline metamorphic rock system and in the coastal plain sediments. In a 1-yr pumping test on a well in the crystalline metamorphic rock the flow was controlled to within 0.1% of the total discharge, which was 0.94 l/s. The water level fluctuations due to earth tides in the pumping well were 10 cm, the same as when this well was not being pumped. (Schicht-ISWS)
W75-07463

INTERACTION OF MULTIPLE JETS WITH AMBIENT CURRENT,
General Electric Co., Philadelphia, Pa. Re-entry and Environmental Systems Div.
R. R. Boericke.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 101, No HY4, Proceedings Paper 11247, p 357-370, April 1975. 7 fig, 16 ref, 2 append.

Descriptors: *Jets, *Circulation, *Model studies, *Velocity, *Mixing, Numerical analysis, Lakes, *Thermal pollution, Currents(Water), Diffusion, Entrainment, Fluid mechanics, Hydraulics, Outlets, Cooling water, Path of pollutants.
Identifiers: Streamlines, Multiple jets.

Numerical calculation of the interaction between a cooling water discharge and an ambient current in a lake was described. The calculations were done by an explicit predictor-corrector method. The calculated flow patterns compared favorably with those obtained by dye studies in a physical model. Results were presented for three values of ambient

current. For an ambient velocity of 1 fps (0.3 m/s), the cooling water is transported directly downstream. For ambient current velocities of 0.5 fps (0.2 m/s) and 0.2 fps (0.1 m/s), a large recirculation region develops in which discharge flow is reentrained in the circulatory flow. When this occurs, the temperature decrease along the discharge jet will be reduced due to the increased temperature of the entrained water. (Adams-ISWS)
W75-07467

THE APPLICATION OF REGIONAL GEOCHEMICAL RECONNAISSANCE SURVEYS IN THE ASSESSMENT OF WATER QUALITY AND ESTUARINE POLLUTION,
Imperial Coll. of Science and Technology, London (England). Applied Geochemistry Research Group.
S. R. Aston, and I. Thornton.
Water Research, Vol 9, No 2, p 189-195, February 1975. 3 fig, 3 tab, 9 ref.

Descriptors: *Regional analysis, *Geochemistry, *Estuarine environment, *Water pollution effects, Water pollution sources, Water quality, Surveys, Mapping, Heavy metals, Trace elements, Spectroscopy, Colorimetry, Analytical techniques, Sediments, Arsenic compounds, Sulfides, Cadmium, Zinc, Lead, Copper, Nickel, Industrial wastes, Rivers, Monitoring, Drainage, Correlation analysis, Salinity.
Identifiers: *England, *Wales, Aquaculture.

Preliminary studies on the application of regional geochemical reconnaissance data, based on stream sediment sampling, to the assessment of water quality and estuarine pollution were encouraging. The use of the trace metal composition of tributary drainage sediments for the prediction of the upper limits of the trace metal concentration ranges in associated waters was demonstrated. This suggested that the available reconnaissance data may be a useful ancillary aid in the location of water monitoring sites in potential problem areas for potable water abstraction. The close association between the trace metal status of estuarine waters and sediments and their respective tributary drainage sediments allowed the use of regional geochemical reconnaissance data in the selection of estuaries for aquaculture and other amenities. Regional geochemical reconnaissance data, although a useful guide to the trace metal status of potable and estuarine waters, does require more detailed follow-up studies in selected areas, especially for temporal studies to establish seasonal variations in surface drainage systems. The extension of the present investigation, involving areas of fairly well known characteristics and relatively small climatic and environmental scope, to lesser known areas and regions of greater natural variations could well prove useful. (Visocky-ISWS)
W75-07469

THE EFFECTS OF GEOLOGY AND LAND USE ON THE EXPORT OF PHOSPHORUS FROM WATERSHEDS,
Toronto Univ. (Ontario). Dept. of Zoology.
P. J. Dillon, and W. B. Kirchner.
Water Research, Vol 9, No 2, p 135-148, February 1975. 6 tab, 77 ref.

Descriptors: *Path of pollutants, *Phosphorus, *Watersheds(Basins), *Geologic control, *Land use, Lakes, Algae, Nutrients, Eutrophication, Domestic wastes, Model studies, *Canada, Soil types, Streamflow, Discharge(Water), Population, Density, Forests, Grazing, Igneous rocks, Bedrock, Soil chemical properties, Urbanization.
Identifiers: *Ontario, *Canadian Shield, Flushing rate, Export coefficient.

The export of total phosphorus from 34 watersheds in southern Ontario was measured over a 20-month period. The annual average export for igneous watersheds (i.e., those of the Canadian Shield) that were forested was 4.8 mg/sq m/yr, significantly different from the average (11.0 mg/sq m/yr) for watersheds that included pasture as well as forest. Similarly, on sedimentary rock, the mean export from forested watersheds (10.7 mg/sq m/yr) differed significantly from those with forest and pasture (28.8 mg/sq m/yr). The differences between watersheds of different geology but similar land use were also highly significant. Additional data from the literature supported these conclusions. Other forested igneous watersheds of plutonic origin averaged 4.2 mg/sq m/yr of total phosphorus exported; forested igneous watersheds of volcanic origin, however, averaged 72 mg/sq m/yr. The overall average export from each type of watershed as classified by geology and land use was very similar to that for the same classification found in this study. The effects of agriculture and urbanization were to greatly increase the total phosphorus exported. Wide ranges of values probably reflect the intensity of land use. (Visocky-ISWS)
W75-07470

WATER QUALITY IN EASTERN OREGON,
Oregon State Univ., Corvallis. Dept. of Soil Science.
V. Van Volk.
In: Land and Water Use in Oregon; Seminar conducted by Oregon State University, Spring Quarter 1974, Water Resources Research Institute, Corvallis, Oregon, p 113-130, July 1974. 12 tab.

Descriptors: *Water quality, *Irrigation, *Oregon, Return flow, Nutrients, Salts, Sediment load, Biological properties, Turbidity, Irrigation effects, Furrow irrigation, Nitrates, Phosphorus compounds, Eutrophication, Analytical techniques, On-site investigations, Sampling.
Identifiers: Snake River(Ore), Malheur River(Ore), Owyhee(Ore).

An irrigation runoff water quality study was initiated in northern Malheur County in eastern Oregon in the spring of 1971. The area surrounding Ontario, Oregon, was selected for the initial study. Samples were collected on a weekly basis from May through September 1971 and thereafter on a monthly basis through 1972 and 1973. With this sampling frequency, trends in nutrient constituents, salt levels, and sediment loads could be seen as the cropping season progressed. All elements and sediments measured increased in the water as the water passed from its source through irrigated fields and into the Snake River. The orthophosphate level in the Owyhee River source water averaged 0.07 ppm, which exceeded the phosphorus level shown to cause eutrophication in lakes provided no other elemental deficiency exists. Orthophosphate levels in the surface runoff waters increased, sometimes slightly exceeding 0.2 ppm PO4-P. Thus, orthophosphate levels are sufficiently high to cause eutrophication in lakes under the right conditions. The nitrate nitrogen levels observed in the surface drains did not exceed 3 ppm during the irrigation season. However, water samples collected from surface drains in the winter months reflected a sizable increase in the nitrate nitrogen levels, a reflection of the increased percentage of percolation as opposed to surface runoff in the drainage water. (See also W75-07507) (Sims-ISWS)
W75-07517

CHEMISTRY IN THE AQUATIC ENVIRONMENT,
Victoria Ministry for Conservation, Melbourne (Australia). Westernport Bay Environmental Study.
For primary bibliographic entry see Field 5A.
W75-07524

FATE OF INSECTICIDES IN AN IRRIGATED FIELD; AZINPHOSMETHYL AND TETRADIFON CASES,
Agricultural Research Organization, Bet-Dagan (Israel). Inst. of Soils and Water.
B. Yaron, H. Bielorai, and L. Kliger.
Journal of Environmental Quality, Vol 3, No 4, October-December, 1974. p 413-417, 7 fig, 7 ref.

Descriptors: *Organophosphorus pesticides, *Insecticides, *Irrigation water, *Pesticide residues, Soil moisture, Percolation, Irrigation, Potatoes, *Path of pollutants, Water pollution sources.
Identifiers: Organchlorine pesticides, *Tetradifon, *Azinphosmethyl, Israel.

The effects and persistence of an organophosphorus (azinphosmethyl) and an organochlorine insecticide (tetradifon) in an irrigated potato field was studied. After two amounts of irrigation water were applied, the kinetics of persistence and the downward movement of the two pesticides were followed during the irrigation season. The azinphosmethyl remained in the upper layers of the soil after irrigation and disappeared from the field 30 days after application. The tetradifon was found in trace amounts in the deeper layer of the soil and persisted throughout the irrigation season. Tetradifon persistence was not affected by the irrigation treatments, but it transport into the soil was affected by the amount of water applied. Some residue of the tetradifon was found in the potato peel, but no trace of azinphosmethyl was found in the potato plant or leaves despite two applications. Differences in irrigation treatments did not affect the amount of tetradifon residue in the peel, therefore its presence may be due only to a process of direct contact. (Mastic-Arizona)
W75-07548

COASTAL SALINITY RECONNAISSANCE AND MONITORING SYSTEM--SOUTH COAST OF PUERTO RICO,
Geological Survey of Puerto Rico, San Juan.
For primary bibliographic entry see Field 5A.
W75-07553

TIME-OF-TRAVEL STUDY, LAKE ERIE-NIAGARA RIVER BASINS,
Geological Survey, Albany, N.Y.
B. Dunn.
Open-file report, January 1975. 41 p, 28 fig, 4 tab.

Descriptors: *Travel time, *New York, *Path of pollutants, Rivers, Streams, Duration curves, Discharge(Water), Lake Erie, Great Lakes.
Identifiers: *Lake Erie basin(NY), *Niagara River basin(NY).

In the Lake Erie-Niagara River basins in New York, time of travel was determined for 80.54 stream miles on Cattaraugus, Cayuga, Ellicott, Murder, and Tonawanda Creeks; Cazenovia Creek basin; and the Buffalo River. Time-of-travel data for several subreaches are depicted in a series of graphs that show time-distance relationships for several discharge rates. Flow-duration curves and minimum average consecutive 7-day discharges for a 10-year return period were determined for one site each on Cattaraugus, Cayuga, and Murder Creeks, and for two sites on Tonawanda and Ellicott Creeks. The 7-day frequency data were also developed for a site on Buffalo River. Effluent discharge was measured at nine treatment plants. Considerable fluctuation in discharge was recorded at some of the plants. Time-of-travel data are shown in graphic form depicting the time-distance relationships for the three major reaches in the Cazenovia Creek basin for several discharge rates. (Knapp-USGS)
W75-07554

GENERALIZED STREAM TEMPERATURE ANALYSIS SYSTEM,
Geological Survey, Bay Saint Louis, Miss. Gulf Coast Hydroscience Center.
D. P. Bauer, H. E. Jobson, and M. E. Jennings.
Reprint from Proceedings of the 21st Annual Hydraulics Division Specialty Conference, Bozeman, Montana, August 15-17, 1973: American Society of Civil Engineers Publication, p 167-177, 1973. 1 fig, 1 tab, 14 ref.

Descriptors: *Water temperature, *Thermal pollution, *Path of pollutants, *Mathematical models, Heated water, Model studies, Jets, Computer programs, Water pollution control.

A rationale is given for linking three existing temperature excess prediction models into a generalized stream temperature analysis system. Using the linkage concept, the output from one temperature model becomes the input to the next model. These models are a two-dimensional surface jet model for near region analysis; a two-dimensional stream-tube model for intermediate region analysis; and a one-dimensional surface exchange model for far region analysis. The linked stream excess temperature models are coded into a computer programming system in such a way that the programs can be used individually or in sequence depending on the problem at hand. An example problem is used to illustrate the calculations. (Knapp-USGS)
W75-07561

GEOHYDROLOGIC CONSIDERATIONS IN THE MANAGEMENT OF RADIOACTIVE WASTE,
Geological Survey, Reston, Va.
G. D. DeBuchananne.
Nuclear Technology, Vol 24, p 356-361, December 1974. 10 ref.

Descriptors: *Radioactive waste disposal, *Nuclear wastes, *Path of pollutants, *Hydrogeology, Climates, Groundwater movement, Aquifer characteristics, Underground waste disposal, Forecasting, Model studies.

Nongaseous radioactive wastes occur as liquids containing high-level concentrations of radionuclides, liquids containing low concentrations of radionuclides, and solids contaminated by radioactivity. Whether released by accident or design into the earth or onto the earth's surface, only water is capable of transporting signficant quantities of radionuclides away from burial sites. Geohydrologic information that must be determined to predict the velocity and direction of waste movement from a site include climate, hydrology, detailed subsurface geology, permeability, porosity, sorptive potential, seismic potential, and geologic history of the area. Since the late 1960's mathematical models have been used to make predictions of waste transport in some hydrologic systems. Intensive field investigations at each site are needed before these models can be used. (Knapp-USGS)
W75-07562

FLUCTUATIONS OF AQUATIC AND TERRESTRIAL INVERTEBRATES IN DRIFT SAMPLES FROM CONVICT CREEK, CALIFORNIA,
Missouri Univ., Columbia. School of Forestry.
For primary bibliographic entry see Field 2I.
W75-07563

DYE-DISPERSION STUDY ON LAKE CHAMPLAIN, NEAR CROWN POINT, NEW YORK,
Geological Survey, Albany, N.Y.
P. H. Hamecher, and L. A. Wagner.
Open-file report 74-355, January 1975. 16 p, 11 fig, 1 ref.

Descriptors: *Path of pollutants, *Dispersion, *Lakes, *New York, Pulp wastes, Fluorescent dye, Tracers, Dye dispersion, Dye releases.
Identifiers: *Lake Champlain(NY).

A dye-dispersion study near the subsurface diffuser pipe of International Paper Company's waste-treatment plant on Lake Champlain near Crown Point, N.Y., October 18, 1973, was intended to define the dispersion pattern of treated effluent discharged into the lake and to determine the volume of diluted effluent in an area adjacent to the diffuser pipe after a period of time. A 20% solution of Rhodamine-WT dye was injected into effluent in the Parshall flume at an average rate of 130 millilitres per minute for 4 hours. Maximum dye concentration of near-surface samples of water in a 114- x 244-metre rectangle downstream from the diffuser pipe was 32 micrograms per litre. Average depth of the dye-colored water in the rectangle was 3.69 metres; volume of that water was 102,800 cubic metres. The dispersion patterns (dye clouds) formed by injected dye are outlined on a map of the study area. (Knapp-USGS)
W75-07571

VELOCITY AND DEPTH MEASUREMENTS FOR USE IN THE DETERMINATION OF REAERATION COEFFICIENTS,
Geological Survey, Trenton, N.J.
For primary bibliographic entry see Field 2E.
W75-07572

WATER-QUALITY STUDIES TODAY AND TOMORROW,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 5A.
W75-07579

EFFECT OF STREAM TURBULENCE ON HEATED WATER PLUMES,
Geological Survey, Menlo Park, Calif.
J. Weil, and H. B. Fischer.
ASCE Proceedings, Journal of the Hydraulics Division, Vol 100, No HY7, Paper 10674, p 951-970, July 1974. 11 fig, 1 tab, 19 ref, append.

Descriptors: *Jets, *Path of pollutants, *Thermal pollution, Heated water, Mixing, Turbulence, Density, Open channel flow.
Identifiers: *Heated water plumes.

A heated water surface jet flowing at the mean local velocity in open channel flow was studied in a recirculating flume. The jet contains no excess momentum that can cause mixing by relative motion of parallel streams. Downstream behavior is determined by buouancy and ambient flow turbulence. The independent variables are a distance ratio, a depth ratio, a friction factor, and a densimetric Froude number. In the range of study, the axis temperature is indepandent of depth ratio and Froude number, and only weakly dependent on friction factor. Mixing is significant, but dilution is less than for momentum jets in still water. Mixing and spread of the plume are determined by buoyant motion and turbulence, but not by jet excess momentum. The insensitivity of axis temperature dilution to initial temperature difference is unexpected because another measure of plume behavior, the plume half width, is predictably dependent on source temperature. (Knapp-USGS)
W75-07587

PHOSPHORUS CYCLING IN LAKES,
North Carolina Univ., Chapel Hill. Dept. of Environmental Sciences and Engineering.
C. R. O'Melia.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-214 745, $3.75 in paper copy, $2.25 in microfiche. North Carolina Water Resources Research Institute, Raleigh, UNC-WRRI Report No 97, December 1974. 45 p, 8 fig, 4tab, 42 ref. OWRT A-074-NC(2). 14-31-0001-4033.

Descriptors: *Phosphorus, Lakes, *Model studies, Computer models, Nutrients, *Cycling nutrients, Retention, Hypoliminon, Forecasting, Estimating.
Identifiers: *Predictive models, Phosphorus concentration, Nutrient loading, Phosphorus cycling, Oxic hypolimnetic waters.

A predictive model for phosphorus in lakes has been developed and verified. The model shows excellent agreement between observed and predicted average phosphorus concentrations for lakes with a wide range of hydraulic detection times (1 to 700 years) and mean depths (14 to 313 meters). At present the model should be applied only to lakes with oxic hypolimnetic waters. The model has been verified for conditions of constant nutrient loadings. The model provides an explanation for the effects of mean lake depth on water quality noted by several limnologists. Vertical exchange of phosphorus forms across the thermocline and natural aggregation within the lake are important processes for the transport and deposition of phosphorus in lakes. The significance of these processes increases with lake depth. Nomographs are presented which summarize model calculations and permit the model to be used for predictive purposes. Required information includes mean lake depth and areal hydraulic loading. Predictions of permissible phosphorus loadings can be made for lakes which meet the conditions assumed in formulating the model. (Stewart-North Carolina State)
W75-07597

FUTURE DREDGING QUANTITIES IN THE GREAT LAKES,
Eastern Michigan Univ., Ypsilanti. Dept. of Geography and Geology.
For primary bibliographic entry see Field 5G.
W75-07603

THE SIGNIFICANCE AND CONTROL OF WASTEWATER FLOATABLES IN COASTAL WATERS,
California Univ., Berkeley. Sanitary Engineering Research Lab.
For primary bibliographic entry see Field 5G.
W75-07606

CHARACTERIZATION AND TREATMENT OF URBAN LAND RUNOFF,
North Carolina Water Resources Research Inst., Raleigh.
For primary bibliographic entry see Field 5D.
W75-07607

DISTRIBUTION AND PERSISTENCE OF 1,2-DIBROMO-3-CHLOROPROPANE IN SOIL AFTER APPLICATION BY INJECTION AND IN IRRIGATION WATER,
California Univ., Davis. Dept. of Nematology.
L. R. Hodges, and B. Lear.
Nematologica, Vol 19, No 2, p 146-158, 1973, Illus.

Descriptors: *Pesticides, *Soil contamination effects, Loam, Sands, Irrigation, Chemical analysis, *Soil contamination, Pollutant identification.
Identifiers: Meloidogyne-incognita, Nematocide, 1,2-dibromo-3-chloropropane, Soil pollution.

Applications of 1,2-dibromo-3-chloropropane (DBCP) were made to mini-field plots of Yolo sandy loam by means of injection, flooding and sprinkler irrigation. Soil samples were removed at various depths and time intervals, processed to extract the chemical and the amount determined by gas chromatography and correlated to the degree of kill of Meloidogyne incognita. Deepest penetration in soil occurred by injection. Application of water to injected plots moved the chemical deeper into the soil than no irrigation. In flood applications most of the chemical was retrained near the soil surface with only small quantities reaching a depth of 15 cm. Application by sprinkler resulted

in shallow penetration. Excellent correlation between depths of chemical penetration and nematode kills were obtained.--Copyright 1974, Biological Abstracts, Inc.
W75-07609

STUDY OF THE RELATION BETWEEN RESIDUAL SODA AND WATER-EXTRACTABLE COMPONENTS OF VACUUM DRUM WASHED KRAFT PULP AND OF REPULPED CORRUGATED CONTAINER EFFLUENT CHARACTERISTICS,
National Council of the Paper Industry for Air and Stream Improvement, Inc., New York.
D. E. Fowler, W. L. Carpenter, and H. F. Berger.
NCASI Technical Bulletin, No. 277, 61 p, October 1974. 22 fig, 14 tab, 16 ref.

Descriptors: *Pulp wastes, *Sodium, *Biochemical oxygen demand, *Chemical oxygen demand, *Color, Industrial wastes, Water pollution sources, Wastes, Sodium sulfate, Sodium compounds, Laboratory tests, Effluents, Model studies, Pollutants, Water reuse, Recycling.
Identifiers: Pulp washing, Chemical losses, Kraft mills, Repulping, Corrugated boxes, Waste paper.

Spent cooking liquor remaining in washed pulp and later diffused into a paper mill's waste water system may account for as much as 70-80% of the total effluent BOD, and 50% of the mill's sodium sulfate (saltcake) losses. Pulp leaching studies were conducted to simulate additional leaching that occurs in a mill system beyond the washing operation. Washed pulps from kraft mills were extracted with hot deionized water, and the extracts analyzed for sodium, BOD, COD, and color. Linear relationships are shown to exist between extractable sodium and BOD and COD. A less precise relationship exists between extractable sodium and color. The correlations of BOD, COD, and color to saltcake losses at the washers may be used to predict reductions of these parameters which would result from improved washer operation. In a short study of repulping of printed and unprinted corrugated containers, no significant differences were noted in water-extractable BOD, COD, and color. (Hansen-IPC)
W75-07634

SPECIFIC WASTEWATER DISCHARGE AND SPECIFIC POLLUTION LOAD OF PAPER MILLS (UEBER DEN SPEZIFISCHEN ABWASSERANFALL UND DIE SPEZIFISCHE SCHMUTZFRACHT VON PAPIERFABRIKEN),
Technische Universitaet, Darmstadt (West Germany). Wasser- und Abwasserforschungsstelle.
H-L. Dalpke, and L. Gottsching.
Wochenblatt fur Papierfabrikation, Vol 102, No 19, p 721-728, 730, October 15, 1974. 2 fig, 7 tab, 19 ref.

Descriptors: Pulp and paper industry, Europe, *Pollutants, *Pulp wastes, *Surveys, *Water pollution sources, *Industrial wastes, Effluents, Suspended solids, Biochemical oxygen demand, Chemical oxygen demand, Water purification, Mechanical equipment, Biological treatment, Foreign countries, Treatment facilities, Efficiencies, Wastes, Waste water treatment, Waste water(Pollution).
Identifiers: *West Germany.

This report by the Water and Waste Water Research Center at the Institute of Paper-making of the Technological University, Darmstadt, gives the results of a survey of 106 German paper mills with a total production in 1973 of about 5 million tons of paper and board. The data are classified according to type of product and include the amount of effluent, settleable solids, BOD, and COD. The clarifying efficiency of mechanical and biological treatment plants is evaluated by data taken before and after treatment. The ratios of BOD to COD are analyzed. The tables in this report summarize the data, giving mean, minimum, and maximum values for each type of mill. (Ward-IPC)
W75-07640

OIL SPILL AND OIL POLLUTION REPORTS JULY 1974 - OCTOBER 1974,
California Univ., Santa Barbara. Marine Science Inst.
For primary bibliographic entry see Field 5G.
W75-07689

CRANKCASE DRAINAGE FROM IN-SERVICE OUTBOARD MOTORS,
Southwest Research Inst., San Antonio, Tex. Dept. of Emissions Research.
C. T. Hare, and K. J. Springer.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-240 691, $5.75 in paper copy, $2.25 in microfiche. Environmental Protection Agency, Cincinnati, Ohio. Report EPA-670/2-74-092, December 1974. 115 p, 48 fig, 18 tab, 25 ref. 1BB038; ROAP 21APO; Task 08 EHS 70-108.

Descriptors: Boats, *Oil pollution, *Oil water, Gasoline, Texas, Lakes, *Water pollution control, Measurement, *Water pollution sources.
Identifiers: *Outboard motors, *Crankcase drainage, San Antonio(Tex).

Crankcase drainage from 35 outboard motors was measured during normal operation on two lakes in the San Antonio area. The motors included a variety of sizes and brand names, and they were tested under prolonged constant-speed conditions as well as cyclic speed conditions designed to simulate user operation in the field. Four engines of the same group were also tested with a drainage intercepting and recirculating device. Drainage was measured by both mass and volume, and results were also computed in mass per unit time (g/hr) and percentage of fuel consumed by weight and by volume. Analysis of some fuel samples was conducted by gas chromatograph, including a few in which drainage was mixed with fuel by the recirculating device mentioned above. Photographic documentation of the test engines, the drainage systems, and test/measurement techniques was also obtained. Based on measurements obtained and estimations of the current outboard motor population, a range for the national total crankcase drainage emissions was estimated. The major causes of variation in drainage rates were engine type, engine operating speed, and differences from one engine to another of the same type (or a similar type). (EPA)
W75-07696

POLLUTED GROUNDWATER: ESTIMATING THE EFFECTS OF MAN'S ACTIVITIES,
General Electric Co., Santa Barbara, Calif. Center for Advanced Studies.
J. F. Karubian.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-241 078, $5.75 in paper copy $2.25 in microfiche . Environmental Protection Agency, Report EPA 680/4-74-002, July 1974. 99 p, 12 fig, 41 tab, 29 ref. GE74TMP-17 1HA328. EPA 68-01-9759, Tasks 1, 3.

Descriptors: *Farm wastes, *Industrial wastes, Waste water(Pollution), *Water pollution control, *Water pollution sources, Federal Water Pollution Control Act, *Groundwater, Liquid wastes, Management, Organic wastes, Pollutants, *Water pollution, Water pollution effects, Water pollution treatment, Feed lots, Fertilizer.
Identifiers: Petroleum refining(Pollution), Phosphate Mining(Pollution).

A method is presented for estimating kinds, amounts, and trends of groundwater pollution caused by man's activities. Preliminary research is described for a number of examples: unlined earthen basins and lagoons used by the pulp and paper industry, petroleum refining, and primary metals industries; phosphate mining wastewater ponds; agricultural fertilizer use; and beef cattle feedlots. Sources of information are primarily census data, other statistical data, and descriptions of production processes. Estimates are made of past and projected volumes and areas covered by potential pollutants so that geohydrological analysis can be used to estimate the infiltration potential of pollutants. Results are not definitive but are intended only to illustrate use of the methodology for geographical areas of interest. (EPA)
W75-07698

MATHEMATICAL MODELING OF PHYTOPLANKTON IN LAKE ONTARIO 1. MODEL DEVELOPMENT AND VERIFICATION,
Manhattan Coll., Bronx. N.Y. Environmental Engineering and Science Program.
For primary bibliographic entry see Field 5C.
W75-07700

CHARACTERIZATION OF VESSEL WASTES IN DULUTH-SUPERIOR HARBOR,
Environmental Quality Systems, Inc., Rockville, Md.
G. D. Gumtz, D. M. Jordan, and R. Waller.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-241 081, $4.25 in paper copy, $2.25 in microfiche. Environmental Protection Agency, Cincinnati, Ohio. Report EPA-670/2-74-097, December 1974. 51 p, 12 tab, 9 ref. 1BB038; ROAP 21-BBU R-802772.

Descriptors: Ships, *Minnesota, Lake Superior, Harbors, *Wastes, *Oil pollution, Water pollution sources, Waste identification.
Identifiers: *Duluth-Superior Harbor(Minn), *Vessel wastes, *Waste characterization.

Five wastes from United States, Canadian, and foreign commercial vessels were studied at the Duluth-Superior Harbor during late 1973: bilge water, non-oily ballast water, sewage, garbage/refuse, and dunnage. Vessels generate bilge water at about 6,650 liters/hour with an average oil content of about 225 milligrams/liter. Waste oil which is apparently discharged to bilges (about 600 grams/hour) appears more consistent than either of these two parameters. Bilge water is a substantial pollution problem: on the average about 40 liters (10 gallons) of oil may be discharged during each day a vessel spends in the harbor. Although containing about twice the common water quality contaminants as the harbor waters, ballast water is not a significant environmental problem. Large quantities are, however, discharged: about 9,000 metric tons/visit by lake and bulk carriers. Sewage is apparently generated onboard vessels consistent with accepted design rates (100 gallons/man/day). Although largely under control, sewage may impact wastewater treatment facilities by being significantly stronger than typical municipal wastewaters. Chemical additives commonly found in vessel sewage may adversely affect wastewater treatment facilities and harbor receiving waters. (EPA)
W75-07701

THE EFFECTS OF AIR AND WATER POLLUTION CONTROLS ON SOLID WASTE GENERATION, 1971-1985, EXECUTIVE SUMMARY,
Stone (Ralph) and Co., Inc., Los Angeles, Calif.
R. Stone.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-240 739, $4.75 in paper copy, $2.25 in microfiche. Environmental Protection Agency. Report EPA-670/2-74-095a, December 1974. 73 p, 14 fig, 15 tab, 22 ref. 1DB314; ROAP 09ABF; Task 03. 68-03-0244.

Descriptors: *Air pollution, *Water pollution control, *Industrial wastes, Waste disposal, Water

treatment,, Residues, Wastes, *Pollution abatement, Waste water treatment.
Identifiers: Pollution control, Solid waste residues, Intermedia transfer.

The affects of air and water pollution controls on solid waste generation were evaluated. The solid wastes from pollution control were identified for individual industrial sectors by their original air or water pollutant constituents, and the treatment process applied. The wastes were categorized by type and by location (rural or urban). Total solid wastes from pollution control activities were estimated for 1971 and projected for 1985. Particulates and sulfur oxides were identified as the major air pollutants capable of generating solid wastes when treated; suspended solids and biological oxygen demand were identified as the principal means of estimating the impact of water pollution control on solid wastes. Important sectors generating solid wastes included power plants (SIC 491), paper and pulp (SIC 26), chemicals (SIC 28), cement and clay (SIC 324-326), steel furnaces (SIC 331), nonferrous smelting and refining (SIC 333, 334), sewerage systems (SIC 4952), and hazardous wastes from uranium mining (SIC 10). Mine tailing ponds were estimated to be a greater source than all the above sources but were not seen to be a landfill disposal problem. This publication is a summary of the more extensive report 'Forecasts of the Effects of Air and Water Pollution Controls on Solid Waste Generation' (EPA-670/2-74-095b). (EPA)
W75-07705

STATE-OF-THE-ART FOR THE INORGANIC CHEMICALS INDUSTRY: INDUSTRIAL INORGANIC GASES,
Illinois Inst. of Tech., Chicago. Dept. of Environmental Engineering.
J. W. Patterson, and R. A. Minear.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-240 961, $7.25 in paper copy, $2.25 in microfiche. Environmental Protection Agency Report EPA-600/2-74-009c, March 1975. 50 p, 7 fig, 13 tab, 2 ref. PE 1BB036 R/T 21 AZQ29, R-800857.

Descriptors: *Gases, *Chemical industry, *Industrial wastes, Inorganic compounds, *Air pollution, *Pollution abatement, Reviews, Effluents, Cooling water, Waste water treatment.
Identifiers: *Inorganic gases, Scrubber solutions.

A literature and field study of the inorganic gas industry revealed that the industry is dominated by (1) air separation plants producing argon, nitrogen and/or oxygen, (2) hydrogen plants and (3) carbon dioxide plants. The major effluent of the industry is cooling water, which may be contaminated with raw product condensates, oil and grease, and water supply and cooling water treatment chemicals. Spent scrubber solutions from product purification may also constitute a significant waste, although newer production technology eliminates this aspect, as well as oil and grease. (EPA)
W75-07708

STATE-OF-THE-ART FOR THE INORGANIC CHEMICALS INDUSTRY: INORGANIC PESTICIDES,
Illinois Inst. of Tech., Chicago. Dept. of Environmental Engineering.
J. W. Patterson.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-240 959, $4.25 in paper copy, $2.25 in microfiche. Environmental Protection Agency Report EPA-600/2-74-009a, March 1975. 63 p, 12 fig, 16 tab, 11 ref. PE 1BB036 R/T 21 AZR 06, R-800857.

Descriptors: *Pesticides, *Inorganic compounds, Chemicals, Chemical wastes, *Agricultural chemicals, *Chemical industry, *Inorganic pesticides, Reviews, Water pollution control, Waste identification, Water pollution sources, *Industrial wastes.
Identifiers: Waste characteristics.

A literature and field study of the manufacture of inorganic pesticides revealed that many inorganic formulations are still widely used for agricultural purposes. The inorganic pesticide industry is a small but distinct segment of the total agricultural chemical industry. Its manufacturing processes and wastewaters contrast sharply with those associated with organic pesticides. The inorganic pesticide market is dominated by eight products, each of which is discussed with respect to its manufacturing effluent characteristics and applicable pollution control technology. Field studies demonstrated that five of the eight products can be manufactured without generating any process wastewater. Aqueous effluents from the manufacture of the remaining three inorganic pesticides appear to be directly controllable by previously demonstrated in-plant control and/or wastewater treatment technologies. (EPA)
W75-07709

RATIONALE AND METHODOLOGY FOR MONITORING GROUNDWATER POLLUTED BY MINING ACTIVITIES,
General Electric Co., Santa Barbara, Calif. Center for Advanced Studies.
D. L. Warner.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-241 402, $4.75 in paper copy, $2.25 in microfiche. Environmental Protection Agency, EPA 680/4-74-003, July 1974. 75 p, 25 fig, 78 ref. 1HA326, EPA 68-01-0759, Task 3.

Descriptors: *Groundwater movement, Legal aspects, *Mine acids, *Mine wastes, *Mine water, *Solid wastes, *Water pollution control, *Water pollution sources, Water pollution, Mining, Monitoring.
Identifiers: *Groundwater monitoring, *Mining pollution.

The rationale and related methodology for monitoring groundwater pollution caused by mining and mineral processing are discussed. Some mines and waste-disposal areas will continue to be pollution sources long after the mines have closed. Because of the broad range of mining activities and diversity of geologic and hydrologic settings, monitoring programs for mineral operations must be individually considered. Technology for at-source control of water pollution from mining is reviewed. Some methods used to improve surface water quality may cause deterioration in groundwater quality. Existing State and Federal laws and regulations for control of mine drainage pollution and the inability of most to influence the design, permitting, or abandonment of underground mines on the basis of water pollution considerations are discussed. (EPA)
W75-07710

THREE DIMENSIONAL TURBULENT DIFFUSION FROM POINT SOURCES OF POLLUTION IN AN OPEN CHANNEL,
Delaware Univ., Newark. Dept. of Chemical Engineering.
M. R. Samuels.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-241 909, $3.75 in paper copy, $2.25 in microfiche. Termination Report, (1974). 24 p, 14 fig, 6 tab, 4 ref. OWRT A-015-DEL(1).

Descriptors: *Diffusion, *Turbulence, Momentum transfer, Pollutants, Heat transport, Eddies, Hydraulics, *Flow rates, River flow, *Open channel flow, Model studies, Flumes, Jets, Path of pollutants, *Flow profiles, Temperature, Velocity, Water pollution sources.
Identifiers: Eddy diffusivities, *Temperature profiles, *Velocity profiles.

A recirculating open channel water flume was used to study momentum and thermal transfer in turbulent channel flows, as a prelude to development of tools for simulating and predicting turbulent diffusion in river flows. The velocity profiles were measured at two different flow rates. Each profile was composed of 90 point velocities measured by means of a calibrated hot film anemometer at regularly spaced points throughout one lateral half of the channel. Temperature profiles were measured downstream from a 'point' source of hot water injected into the main channel flow. The same two water flow rates and channel slopes were used as in the velocity profile studies. Techniques have been developed for determining eddy diffusivities for both momentum and heat transport from the measured velocity and temperature profiles. The momentum diffusivity model developed yields a scalar diffusivity which is a function of position. The thermal diffusivity model yields average vertica and lateral diffusivities. Although quantitative comparison of the momentum and thermal diffusivities determined from the experimental data is not possible, their relationship is in qualitative agreement with that expected from the Reynolds analogy.
W75-07723

COOPERATIVE PHENOMENA IN ISOTOPIC HYDRODYNAMIC DISPERSION,
Nevada Univ., Reno. Desert Research Inst.
C. M. Case, and C. L. Carnahan.
Available from the National Technical Information Service, Springfield, Va. 22161 as PB-241 896, $4.75 in paper copy, $2.25 in microfiche. Nevada Water Resources Research Center, Reno, Project Report No 30, April 1975. 83 p, 19 fig, 7 tab, 19 ref, append. OWRT A-048-NEV(1). 14-31-0001-3828.

Descriptors: *Hydrology, Statistical methods, *Dispersion, Hydrodynamics, *Path of pollutants, *Isotope studies, Tritum, *Diffusion, *Molecular structure, Water structure.

This study theoretically examines the effects on the rate of hydrodynamic dispersion of two types of dispersing material - isotopic (tritium) and suspended - as an example of cooperative phenomena using statistical mechanics. By these means a preliminary formula describing hydrodynamic dispersion in relation to pollutants in water was developed. For clusters with higher binding energy, corresponding either to a higher concentration of isotopes or larger atomic numbers, e.g., tritium versus deuterium, more thermal energy is required to achieve a given level of dispersion. For removal of water molecules from the cluster, the curves of entropy versus temperature lie below each other as successive configurations contain fewer and fewer radioactive isotopes. Lower concentrations of radioactive isotopes mean lower binding energy in the cluster and hence less energy is necessary to go from one configuration to the next. A tetrahedral picture for liquid water is at best only approximately correct, and a systematic examination of the effect of vacancies in and distortions of the tetrahedral lattice should be carried out. The relative values of Helmholz free energy and entropy are of use in describing the diffusion of deuterium and tritium in water. The next important step is to calculate the diffusion coefficient for radioactive water in water using the model developed. (Fallon-Nevada)
W75-07725

THE WATER QUALITY AND TIDAL FLUSHING CHARACTERISTICS OF THREE SMALL BOAT BASINS; DES MOINES MARINA, EDMONDS HARBOR, AND NEWPORT SHORES,
Washington Univ., Seattle. Dept. of Civil Engineering.
C. R. Knoll.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-241 913, $5.75 in paper copy, $2.25 in microfiche. M S Thesis, 1974. 119p, 31 fig, 1 tab, 67 ref, 2 append. OWRT A-064-WASH(1). 14-31-0001-4048.

Descriptors: *Washington, Tidal waters, Tidal effects, *Water quality, Biology, Hydraulic models, Harbors.
Identifiers: Des Moines Marina(Wash), Edmonds Harbor(Wash), Newport Shores(Wash), *Tidal flushing.

Tide induced circulation patterns and gross flushing characteristics of Des Moines Marina, Edmonds Harbor, and Newport Shores are compared with field observations of current and water quality within the marinas. As a general rule, no gross pollution problems within boat basins were noticeable. In considering water quality versus relative stagnation of harbor waters, water quality seemed to be related to circulation characteristics. The greater the circulation, the less difference in water quality between the waters inside and outside of the boat basin. The fresh water site, Newport Shores, seems to have more of a potential eutrophication problem than the marine sites of Des Moines Marina and Edmonds Harbor but it is not critical now. A sampling procedure is suggested for obtaining standardized descriptions of the quality of water within a marina as compared to the quality of ambient waters. The suggested approach incorporates sampling at that time on the tidal cycle when spatial variations in local exchange and water quality within the marina basin are minimum.
W75-07726

HYDROLOGICAL AND PHYSICAL-CHEMICAL INVESTIGATIONS ON THE PO RIVER AT POLESELLA: 2. JULY 1970-JUNE 1973, (IN ITALIAN),
Istituto di Biologia del Mare, Venice (Italy).
V. U. Fossato.
Arch Oceanogre Limnol. Vol 18, No 1, p 47-58. 1973, Illus, English summary.

Descriptors: *Nutrients, Rivers, *Water chemistry.
Identifiers: *Po river, Adriatic sea, *Italy.

The research begun in 1968 on the waters of the Po river at Polesella is continued. The results, not withstanding the variability of the physical-chemical and hydrological conditions of the river, make evident the seasonal character of the variations of some chemical parameters and allow the contribution of nutrients by the river to the Adriatic sea to be estimated.--Copyright 1974, Biological Abstracts, Inc.
W75-07741

HYDROLOGICAL AND PHYSICAL-CHEMICAL INVESTIGATIONS ON THE ADIGE RIVER AT BOARA PISANI: 2. JULY 1970-JUNE 1972, (IN ITALIAN),
Istituto di Biologia del Mare, Venice (Italy).
V. U. Fossato.
Arch Oceanogr Limnol. Vol 18, No 1, p 59-70. 1973, Illus, English summary.

Descriptors: *Nutrients, Rivers, *Water chemistry.
Identifiers: Adriatic sea, *Adige river, *Italy.

Results obtained in the preceding research biennium are confirmed and the physical-chemical characteristics of the waters of the Adige river (Italy) at various seasons and different flow levels outlined. From these data it is possible to estimate the quantity of N, P and Si soluble salts brought by the river to the Adriatic Sea and utilized by phytoplankton.--Copyright 1974, Biological Abstracts, Inc.
W75-07742

DISTRIBUTION OF COLIFORM BACTERIA IN THE COASTAL WATER, (IN JAPANESE),
Tokai Univ., Tokyo (Japan). Coll. of Marine Science and Technology.
K. Ogawa.
J Oceanogr Soc Jpn. Vol 29, No 5, p 203-208. 1973, Illus, English summary.

Descriptors: *Coliforms, Rivers, Estuaries, Bays, Harbors, Distribution, *Bacteria.
Identifiers: *Aerobacter-Aerogenes, *Escherichia-Coli, *Escherichia-Freundii, *Japan, Orido Bay, Shimizu Harbor.

Distribution of coliform bacteria was surveyed monthly during July-1968 through Dec.-1969 in Shimizu Harbor and Orido Bay, Japan. Among 3 significant rivers flowing into the coastal region, the water of Tomoe River was most microbiologically polluted. Throughout the period of investigation horizontal distribution of the bacterial density was highest at the estuary of the Tomoe River, and its density decreased toward Shimizu Harbor and Orido Bay. The bacterial density decreased from surface to deeper layer. High density of bacteria was observed in the bottom deposits in winter. The bacterial distribution might be disturbed by currents caused by geographical features. Various types of coliforms were isolated in the surveyed areas. All types of Escherichia coli, E. freundii and Aerobacter acrogenes appeared in the area of estuaries, and only limited types occurred offshore. Bacterial number increased from upper stream toward the mouth of each river. The bacterial density differed from river to river. In the rivers flowing through the city the bacterial density changed with water temperature, whereas in the river running through agricultural districts it might be affected by rainfall.--Copyright 1974, Biological Abstracts, Inc.
W75-07744

ROLE OF CRUCIAN CARP IN TRANSMISSION OF ENTERIC PATHOGENS, (IN KOREAN),
Catholic Medical Coll., Seoul (Republic of Korea). Dept. of Preventive Medicine.
P. K. Lee.
J Cath Med Coll. Vol 23, p 379-386. 1972, English summary.

Descriptors: *Carp, *Enteric bacteria, Pathogenic bacteria, *Fish diseases, Salmonella, Shigella, Vibrio.
Identifiers: *South Korea(Han River).

Crucian carp can carry and transmit enteric pathogens such as Salmonella, Shigella or Vibrio. Enteric pathogens were isolated from Han river water samples, and crucian carp gills and intestinal contents. The duration of survival of these pathogens in fish gut and the role of crucian carp as a vector were studied. At water temperatures of 24-27C the duration of survival of S. typhi and Sh. dysenteriae (A-1) in the gut of the crucian carp was from 5-6 days after feeding. At water temperatures of 1-5C, it was from 6-7 days in the fish gut. Duration of survival of V. eltor (Ogawa type) and V. parahaemolyticus (K-3 type) was similar. Survival of these pathogens in water was twice as long as that in the fish gut.--Copyright 1973, Biological Abstracts, Inc.
W75-07747

MICROBIOLOGICAL AND ENZYMIC ACTIVITY OF IRRIGATED AND FERTILIZED SOIL (IN RUSSIAN),
Khersonskii Selskokhozyaistvennyi Institut (USSR).
For primary bibliographic entry see Field 3F.
W75-07764

RENOVATION OF WASTES BY MINE TAILINGS PONDS,
Idaho Univ., Moscow.
L. L. Mink, R. E. Williams, A. T. Wallace, and L. M. McNay.
Mining Engineering, Vol 25, No 7, p 81-88, July, 1973. 8 tab, 5 fig, 16 ref.

Descriptors: *Mine wastes, *Pollution abatement, *Metals, Mining engineering, Cadmium, Copper, Lead, Zinc, Effluents, Mine drainage, Ponds, Water pollution control, Water pollution sources.

Samples were collected from the wastes disposal operations of seven major mines in the Coeur d'Alene district. The supernatant of the samples was analyzed for cadmium, copper, lead, antimony and zinc, using an atomic absorption spectrophotometer. The quantities of heavy metal ions in the water at the inflow and outflow points. are described. These data reflect the immediate impact tailings pond effluent may have on the environment. Design and operation of the tailings pond have an obvious effect on the quality of water discharged from the pond. Most ponds which discharge acceptable water are utilizing a form of peripheral discharge for the inflow and a decent system for the outflow. (Jernigan-Vanderbilt)
W75-07800

EFFECT OF DIETARY SELENIUM AND AUTOXIDIZED LIPIDS ON THE GLUTATHIONE PEROXIDASE SYSTEM OF GASTROINTESTINAL TRACT AND OTHER TISSUES IN THE RAT,
California Univ., Davis. Dept. of Food Science and Technology.
For primary bibliographic entry see Field 5C.
W75-07801

FLUORIDE: GEOCHEMICAL AND ECOLOGICAL SIGNIFICANCE IN EAST AFRICAN WATERS AND SEDIMENTS,
Michigan Univ., Ann Arbor. Dept. of Zoology.
P. Kilham, and R. E. Hecky.
Limnology and Oceanography, Vol 18, No 6, p 932-945, November, 1973, 4 tab, 2 fig, 48 ref, Contract NSF (GB-8328X).

Descriptors: *Fluoride, *Sediments, Rivers, Chloride, Rocks, Chemical reactions, Lakes, Aquatic life, Geochemistry, Distribution, *Africa.
Identifiers: *East Africa, *Tanzania.

The geochemistry of fluoride in East African lakes and rivers was examined to elucidate processes of fluoride acquisition, concentration, removal, and diagenesis in inland waters in a region relatively little influenced by man. The range of fluoride concentrations (0.02-1,627 mg/liter) is the greatest found anywhere. A strong correlation was found between the concentration of fluoride in the predominant crystalline rocks of each particular drainage basin and the F:Cl ratio in surface waters. Because fluoride-rich volcanic rocks are common in East Africa very high fluoride concentrations, the products of chemical weathering, are often observed. Fluoride removal from surface waters is not significant; concentration by evaporation proceeds until saturation with respect to villiaumite is reached. Fluoride: Chloride ratios for the interstitial waters of a 7-m core from Small Momela Lake, Tanzania, indicate that in sedimentary environments fluoride may be removed from pore waters as fluoride and possibly fluorapatite. Geographical evidence suggests that the high fluoride concentrations may influence the distribution of man, livestock, zooplankton, phytoplankton, and higher aquatic plants. (Jernigan-Vanderbilt)
W75-07802

INDUSTRIALIZATION AFFECTS HEAVY METAL AND CARBON ISOTOPE CONCENTRATIONS IN RECENT BALTIC SEA SEDIMENTS,
Kiel Univ. (West Germany). Institut fuer Reine und Angewandte Kernphysik.
H. Erlenkeuser, E. Suess, and H. Willkomm.
Geochimica et Cosmochimica Acta, Vol 38, No 61, p 823-842 June, 1974. 5 fig, 4 tab, 62 ref.

Descriptors: *Industrial wastes, *Heavy metals, *Sediments, Radioisotopes, Tracers, Seawater, Cadmium, Lead, Zinc, Copper, Iron, Manganese, Nickel, Cobalt, Fossil fuels, Water pollution, Distribution.
Identifiers: *Baltic Sea.

Recent sediment cores of the western Baltic Sea were analyzed for heavy metal and carbon isotope contents. The sedimentation rate was determined from radio-carbon dates to be 1.4mm/yr. The 'recent age' of the sediment was about 850 yr. Within the upper 20 cm of sediment, certain heavy metals became increasingly enriched towards the surface; Cd, Pb, Zn and Cu increased 7-, 4-, 3-, and 2-fold, respectively, whereas Fe, Mn, Ni and Co remained unchanged. Simultaneously, the radiocarbon content decreased by about 14 per cent. The enrichment in heavy metals as well as the decrease in the C14 concentration during the last 130 plus or minus 30 yr parallels industrial growth as reflected in European fossil fuel consumption within that same period of time. The near-surface sediments are affected by residues released from fossil fuels at the rate of about 30 g/sq m yr for the past two decades. The residues have a pronounced effect on the heavy metal and carbon isotope composition of the most Recent sediments allowing estimates to be made for sedimentation, erosion and heavy metal pollution. (Jernigan-Vanderbilt)
W75-07803

HYDROGEOLOGICAL MAPS OF THE ALLUVIAL AQUIFER IN AND ADJACENT TO THE ROCKY MOUNTAIN ARSENAL, COLORADO,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 7C.
W75-07836

5C. Effects Of Pollution

ENVIRONMENTAL QUALITY AND SAFETY, VOL. 2. GLOBAL ASPECTS OF CHEMISTRY, TOXICOLOGY AND TECHNOLOGY AS APPLIED TO THE ENVIRONMENT.
For primary bibliographic entry see Field 6G.
W75-07355

INTERACTING CARBON AND LIGHT LIMITS TO ALGAL GROWTH,
Missouri Univ., Columbia. Dept. of Sanitary Engineering.
R. E. King.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-241 517, $4.75 in paper copy, $2.25 in microfiche. MS thesis, 1974. 82 p, 32 fig, 6 tab, 14 ref. OWRR A-071-MO(1).

Descriptors: *Photosynthesis, *Carbon, *Light, *Algae, *Plant growth, Light intensity, Scenedesmus, Anabaena, Chlamydomonas, Growth rates, Limiting factors, Carbon dioxide, Hydrogen ion concentration, Equations.
Identifiers: Pediastrum biradiatum, Scenedesmus acutiformis, Anabaena variabilis, Phormidium olivacea.

Two separate investigations were conducted, the first was to evaluate the differences of algae ability to extract carbon from a single concentration of carbonate-bicarbonate alkalinity under different light intensities and, the second, to evaluate the ability of algae to extract carbon from different carbonate-bicarbonate alkalinities at a single constant light intensity. The test algae were Pediastrum biradiatum, Scenedesmus acutiformis, Anabaena variabilis, and Phormidium olivacea. The free carbon dioxide concentration at which the algae became carbon limited varied with both light intensity and type of algae. Pediastrum biradiatum was able to fix carbon from the carbonate-bicarbonate alkalinity to a lower free carbon dioxide value with increasing alkalinity at a light intensity of 130 foot candles but not at 42 foot candles. Scenedesmus acutiformis could fix carbon from the carbonate-bicarbonate alkalinity only to a maximum pH of 10.80. The relations of the specific algal growth rate to light intensity follows the Monod equation reasonably well. The relations of the specific growth rate to free carbon dioxide concentration follows the Monod equation only at high concentrations of free carbon dioxide. The interactions imposed on the specific growth rate of algae by simultaneous limitation of carbon availability and light intensity is multiplicative. (Jones-Wisconsin)
W75-07357

EFFECT OF SOIL ENRICHMENT WITH MINERAL ELEMENTS AND FERTILIZERS ON SURFACE WATER AND PLANTS,
Ghent Rijksuniversiteit (Belgium). Faculteit Landbouwwetenschappen.
For primary bibliographic entry see Field 5B.
W75-07368

ECOLOGY OF THE PLANKTON OF PRUDHOE BAY, ALASKA,
Alaska Univ., College. Inst. of Marine Science.
R. A. Horner, K. O. Coyle, and D. R. Redburn.
IMS Report No. R74-2; Sea Grant Report No. 73-15, August 1974. 95 p, 4 fig, 14 tab, 96 ref, append. (NOAA-75022105). OSG 04-3-1581-41, ONR N00014-67-A-0317-003.

Descriptors: *Phytoplankton, *Algae, *Zooplankton, Diatoms, *Alaska, Arctic, Polar regions, Aquatic microorganisms, Marine algae, Marine plants, Aquatic plants, Aquatic life, Aquatic animals, Ecosystems, Aquatic productivity, Food webs, Harvesting of algae, Water temperature, Salinity, Water pollution effects, Nutrients.
Identifiers: *Prudhoe Bay(AK), Pennate diatoms, Species composition, Ice algae, Water transparency, Nutrient concentration.

Basic quantitative data are presented on the phytoplankton of the Prudhoe Bay area. The phytoplankton community was selected for study because phytoplankton are the primary energy source upon which the marine food web is based and any major changes in the phytoplankton composition might affect the entire ecosystem. The phytoplankton community is described in terms of species composition and relative numbers of individuals present. Primary productivity; contribution of ice algae to primary production; and major environmental parameters influencing primary productivity, such as temperature, salinity, nutrient concentrations, and water transparency are discussed. A section on zooplankton describes the spatial variability in community compositon and the relative abundance of species present; and the relationship of observed variability to hydrographic conditions existing at station locations. (NOAA)
W75-07407

THERMOREGULATORY BEHAVIOR AND DIEL ACTIVITY PATTERNS OF BLUEGILL, LEPOMIS MACROCHIRUS, FOLLOWING THERMAL SHOCK,
Wisconsin Univ., Madison. Lab. of Limnology.
T. L. Beitinger.
Available from Superintendent of Documents C55.13:72/4, Washington, D.C. 20402, for $2.75. Fishery Bulletin, Vol 72, No 4, p 1087-1093, October 1974. 3 fig, 1 tab, 29 ref, (NOAA 74120905-9).

Descriptors: *Thermal pollution, *Animal behavior, *Heated water, Electric powerplants, Fish, Diurnal distribution, Diel migration, Wisconsin, Water pollution effects, *Sunfishes.
Identifiers: *Thermal shock, *Thermoregulation, Centrarchidae, Locomotion.

Individual bluegill were allowed to thermoregulate for 3 days in a temperature-preference apparatus and then were exposed for 30 min to one of three temperature treatments: 21.0 deg., 31.0 deg, or 36.1 deg. C. Fish exposed to 31 deg C served as controls for handling procedures. Thermoregulatory performance of surviving fish was monitored for an additional 3 days. Pretreatment results indicated mean lower and upper avoidance temperatures of 29.3 deg and 33.1 deg, and 31.2 deg. C as the midpoint of the preferred range. All 20 fish exposed to 21 deg and 31 deg C survived treatment and demonstrated no significant differences between pretreatment and posttreatment thermoregulatory performance. Thirty-five percent of fish (7 of 20) exposed to 36.1 deg. C died during treatment. Fish surviving the 36.1 deg C. treatment retained the ability to thermoregulate; however, their mean lower and upper avoidance temperature increased 0.6 deg. and 0.7 deg C, respectively. Activity patterns were typically diurnal, but variable, in all three treatment groups. Immediately after treatment, the activity of fish exposed to 21 deg and 36.1 deg. C was markedly decreased. Thereafter, activity tended to be higher in the 21 deg C group and lower in the 36.1 deg C group then during the pretreatment period. (NOAA)
W75-07413

TOXAPHENE INTERACTIONS IN ESTUARINE ECOSYSTEMS,
Georgia Univ., Savannah. Marine Extension Center.
Robert J. Reimold.
Marine Science Center, Technical Report Series Number 74-6, 1974. 80 p, 11 fig, 7 tab, 6 ref, 2 append. (NOAA-74121103).

Descriptors: *Water pollution sources, *Ecosystems, Estuaries, Grasses, Industrial wastes, *Georgia, Monitoring, Pollutants, Bioindicators, Ecology, Coasts, *Water pollution effects.
Identifiers: *Toxaphene, *Species diversity, Pollution sources, Spartina alterniflora, Cordgrasses, Anchovy, Flushing, Duplin Estuary(Geo), Terry Creek(Geo), Brunswick East Estuary(Geo).

During 1973-1974, the toxaphene concentration in effluent from a Brunswick manufacturing plant continued to decrease from around 30 ppb to near 6 ppb. Concurrent with this was an increase in the species diversity of organisms in waters receiving the effluent. During 1973-1974 the diversity index, H Bar, was 1.9977 in the Duplin Estuary (considered to be undisturbed and free from any toxaphene contamination) contrasted with a higher index of 2.2577 in Terry Creek (which receives effluent containing toxaphene). Experiments to follow the movement of toxaphene from the substrate into the salt marsh cordgrass, Spartina alterniflora, using 36Chlorine labeled toxaphene were initiated. Spartina alterniflora was grown in sea water media for 26 and 100 days in a controlled environmental chamber. The greatest uptake was found in the roots and rhizomes. The least uptake was found in the leaves. Continued monitoring of toxaphene in the fauna of Terry Creek suggests as before that the oyster is not as good a biological monitoring organism as is the common anchovy. Toxaphene concentrations in the white shrimp are higher in the head and thorax than in the abdomen although the concentrations are much lower than found in preceding years. (NOAA)
W75-07414

PROBLEMS AND POTENTIALS OF RECYCLING WASTES FOR AQUACULTURE,
Massachusetts Inst. of Tech., Cambridge. Sea Grant Project Office.
For primary bibliographic entry see Field 5D.
W75-07416

THE APPLICATION OF REGIONAL GEOCHEMICAL RECONNAISSANCE SUR-

VEYS IN THE ASSESSMENT OF WATER QUALITY AND ESTUARINE POLLUTION,
Imperial Coll. of Science and Technology, London (England). Applied Geochemistry Research Group.
For primary bibliographic entry see Field 5B.
W75-07469

THE PREVALENCE OF HUMAN DENTAL CARIES AND WATER-BORNE TRACE METALS,
Forsyth Dental Center, Boston, Mass.
For primary bibliographic entry see Field 5A.
W75-07479

TOXICITY OF THE FLESH OF COMMON FISH TO THE WHITE MOUSE (MUS MUSCULUS VAR. ALBA),
Poitiers Univ. (France). Laboratoire de Microbiologie et Biologie Maritime.
J. Brisou.
C R Seances Soc Biol Fil. Vol 165, No 3, p 679-682, 1971, Illus.

Descriptors: Fish, Herrings, Saline water fish, Freshwater fish, Water pollution, *Pollutant identification, *Fish toxins, *Rodents, Laboratory animals, Toxicity.
Identifiers: Carassius-auratus, Clupea-harengus, Clupea-pilchardus, Cod, Gadus-luscus, Goldfish, Herring, Mackerel, Mus-musculus-var-alba, Sardine, Scomber-scombrus, *White mice, *Mice.

Toxicity of the flesh of common fish to the white mouse was studied. The species of fish included cod (Gadus luscus), mackerel (Scomber scombrus), sardines, (Clupea pilchardus), herring (C. harengus) as representatives of salt water fishes. The fresh water fish were the goldfish (Carassius auratus) and the silver colored variant (Carassius carassius). The food supply in fresh condition, was given to the mice each day, along with a supply of water. The observation period lasted up to 3 wk. Symptoms of intoxication usually appeared between the 5th and 10th day. The mouse is extremely sensitive to acute intoxication by the flesh of fish of many countries including those of temperate zones and of common human consumption. These findings suggest reservations in the use of the method of biological detection of toxic pollutants in water involving observing the effect of chemical contamination on the food chain.--Copyright 1974, Biological Abstracts, Inc.
W75-07483

MERCENARIA MERCENARIA (MOLLUSCA: BIVALVIA): TEMPERATURE-TIME RELATIONSHIPS FOR SURVIVAL OF EMBRYOS AND LARVAE,
Maryland Univ., Solomons. Natural Resources Inst.
V. S. Kennedy, W. H. Roosenburg, M. Castagna, and J. A. Mihursky.

Descriptors: *Clams, *Mollusks, *Cooling water, *Electric powerplants, *Mortality, Survival, Shellfish, Embryos, Larvae, Water temperature, Entrainment, Water pollution effects, *Thermal pollution.
Identifiers: Mercenaria mercenaria(L), Bivalvia, Hard clam, Temperature tolerance.

To estimate the effects of entrainment of Mercenaria mercenaria embryos and larvae in the cooling-water systems of steam-electric power plants, a thermal gradient apparatus was used. Cleavage stages, trochophore larvae and straight-hinge veliger larvae were subjected to 11 different temperatures for 8 different time periods. There was a direct relationship of mortality with temperature increase and, at higher temperatures, with increase in time exposure. As the clams aged, temperature tolerance increased, with cleavage stages most sensitive to higher temperature and straight-hinge larvae least sensitive. Multiple regression analyses of percentage mortality on temperature and time produced estimating equations that allow prediction of percentage mortality under different conditions of temperature and time exposure. Entrainment of M. mercenaria embryos and larvae in cooling systems of power plants should be as short as possible if mortality is to be held to a minimum. (NOAA)
W75-07549

PHOSPHORUS CYCLING IN LAKES,
North Carolina Univ., Chapel Hill. Dept. of Environmental Sciences and Engineering.
For primary bibliographic entry see Field 5B.
W75-07597

PHYTOPLANKTON COMPOSITION AND ABUNDANCE IN LAKE ONTARIO DURING IFYGL,
Michigan Univ., Ann Arbor. Great Lake Research Div.
E. F. Stoermer, M. M. Bowman, J. C. Kingston, and A. L. Schaedel.
Environmental Protection Agency, Report EPA-660/3-75-004, February 1975. 373 p, 61 fig, 7 tab, 65 ref. 1BA026. R800605.

Descriptors: Algae, *Phytoplankton, *Lake Ontario, Nusiance algae, *Seasonal, *Succession, Lakes, *Lake stages, Diatoms, Nutrients, Cyanophyta, Chlorophyta, Distribution, *Eutrophication, Water pollution effects, Halophytes, Aquatic plants.
Identifiers: International field, Year for the Great Lakes.

Based on samples collected during the International Field Year for the Great Lakes, the phytoplankton assemblage of Lake Ontario is dominated by taxa indicative of degraded water quality, including many potentially nusiance producing species. Many taxa characteristic of the offshore waters of the upper Great Lakes are either absent from the flora or very rare. Compared to the upper lakes, the flora of Lake Ontario undergoes extreme seasonal succession, with diatoms predominating during the winter and early spring, green algae becoming abundant during the summer, blue-green algae showing a distinct fall peak. Various species of microflagellates are a relatively important element of the flora during all seasons. Succession during the spring bloom appears to be controlled by the thermal bar, and the data suggest control by depletion of essential nutrients following stratification. Striking differences were apparent in samples collected on comparable dates in the spring of two successive years. These differences apparently result from exceptional weather conditions which prevailed during the first sampling period. The distribution of species particularly tolerant of disturbance appeared to be controlled by both proximity to major population centers and lake morphometry. The abundance of halophilic species in most productive areas suggests effects of conservative ion contamination as well as nutrient enrichment. (EPA)
W75-07604

EUTROPHICATION OF SURFACE WATER - LAKE TAHOE'S INDIAN CREEK RESERVOIR,
Lake Tahoe Area Council, South Lake Tahoe, Calif.
P. H. McGauhey, D. B. Porcella, and G. L. Dugan.
Environmental Protection Agency, Report EPA-660/3-75-003, February 1975. 188 p, 31 fig, 10 tab, 33 ref. EPA, WQO Grant Nos 16010 DNY, 16010 DSW.

Descriptors: *Eutrophication, *Nitrification, *Denitrification, *Reclaimed wastes, *Aquatic productivity, Density, *Bioassay, Limnology, *Cycling nutrients, *Benthos, Aquatic microorganisms, Algae, Vascular plants, Fish population, Tertiary treatment, Nutrients, Biomass, Cyanophyta, Phosphorus, Water pollution effects, California.
Identifiers: *Indian Creek Reservoir(Calif), *Sewage export, Lake Tahoe area(Calif).

From April 1969 to October 1974 field and laboratory analyses and observations were made at approximately weekly intervals to evaluate the relationship between the quality of water impounded at Indian Creek Reservoir (ICR) and the reclaimed water exported by the South Tahoe Public Utility District. The reclaimed water comprised from 70 to 80 per cent of the annual impoundment. On the average the reclaimed water contained 0.1 to 0.2 mg/l of phosphorus and 15-24 mg/l of ammonia, the latter making it toxic to fish implanted in ICR. However, as the reservoir matured, nitrification-denitrification removed most of the nitrogen from the system and by March 1970 the reservoir had become a excellent trouth fishery. Excess N is comparison with P evidently precluded blooms of blue green algae but low phosphorus did not prevent the impoundment from becoming typical of a highly productive environment, with vascular plants invading to considerable depths because of the high degree of clarity of the reclaimed water. By 1974 the biosystem was at an approximately steady state. This state may not remain because of the appearance of epiphytic blue green algae which caused taste and odor problems in the water and in the fish. It is concluded that the reservoir responds to more complex factors than are measurable by analysis of reclaimed water. The results show why a system of wastewater reclamation must be designed on the basis of the natural as well as the man-controlled components of the system, and points the way to the necessary parameters and institutional concepts if water is to be reclaimed for a specific purpose. (EPA)
W75-07605

THE EFFECTS OF EFFLUENT FROM THE CANADIAN TEXTILE INDUSTRY ON AQUATIC ORGANISMS: A LITERATURE REVIEW,
Fisheries and Marine Service, Winnipeg (Manitoba).
B. Thompson.
Technical Report No. 489, 108 p, 1974. 3 fig, 26 tab, 155 ref.

Descriptors: *Textiles, *Water pollution effects, *Reviews, *Industrial wastes, *Toxicity, *Aquatic life, Water pollution sources, Effluents, Wastes, Waste water(Pollution), Industries, Canada, Foreign countries, Publications, Detergents, Dyes, Acids, Salts, Chemical wastes, Chemicals, Phenols, Organic compounds, Metals, Properties, Biochemical oxygen demand, Chemical oxygen demand, Suspended solids, Dissolved solids, Hydrogen ion concentration, Color, Odor.

Production figures for the Canadian textile industry are presented and the distribution of the industry, particularly in the provinces of Ontario and Quebec, is discussed. Processes used in textile manufacture are explained and the general properties (BOD, COD, suspended solids, dissolved solids, pH, color, and odor) of textile effluents are described, followed by the properties of waste from individual processes (scouring, dyeing, washing, neutralization, and bleaching). The toxicity to aquatic organisms of synthetic detergents, dyes, dye carriers, acids, salts, and various other process chemicals is evaluated in detail. Finally, it is pointed out that important areas for future research are the toxicity of dyes, dye carriers, and other phenolic compounds, and their toxicity when mixed with other components of the effluent. (Witt-IPC)
W75-07644

MARINE ALGAL ASSAY PROCEDURE BOTTLE TEST,
Pacific Northwest Environmental Research Lab., Corvallis, Ore.
For primary bibliographic entry see Field 5A.
W75-07686

IMPACT OF THE USE OF MICROORGANISMS ON THE AQUATIC ENVIRONMENT,
Environmental Protection Agency, Gulf Breeze, Fla. Gulf Breeze Environmental Research Lab.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-240 159, $8.50 in paper copy, $2.25 in microfiche. Report EPA-660/3-75-001, January 1975, 226 p, (Proceedings of Workshop-Symposium held at Pensacola Beach, FL, April, 1974 edited by A.W. Bourquin, S.P. Meyers, and D.G. Ahearn). 1EA077/010/25AJN.

Descriptors: *Microorganisms, *Insect control, Bacteria, Aquatic weed control, Aquatic environment, Viruses, Fungi, Protozoa, Water pollution control, Pathogenic bacteria, Arctic, Oil wastes, Louisiana, Salt marshes.
Identifiers: *Hydrocarbon degrading microorganisms.

Proceedings are presented of a symposium-workshop sponsored by the EPA Gulf Breeze Environmental Research Laboratory to determine the possible impact of artificially introducing microbial insect control agents or oil-degrading agents into the aquatic environment. The efficacy and safety testing, especially against non-target aquatic organisms, for use of bacteria, viruses, fungi, and protozoa to control aquatic insect pests is discussed with remarks of panel members representing government, academic, and industry. Special attention is given to persistence of pathogens in aquatic environments as well as control of aquatic weeds and other non-insect pests. The use of microorganisms to clean up oil spills in aquatic environments is discussed by industrial, academic, and governmental scientists. Special considerations are given to selection of hydrocarbonoclastic microorganisms and use of these microorganisms in special environments--Arctic regions and Louisiana salt marshes. Summary papers are presented for each panel concerned with microbial pesticides and one summary for the session on microbial degradation of oil. Bibliographies are presented with each paper and discussion. (EPA)
W75-07687

EUTROPHICATION OF LAKE TAHOE EMPHASIZING WATER QUALITY,
California Univ., Davis. Inst. of Ecology.
C. R. Goldman.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-240 318, $11.25 in paper copy, $2.25 in microfiche. Environmental Protection Agency Report EPA-660/3-74-034, December 1974. 408 p, 77 fig, 36 tab, 164 ref. 1BA031 16010 DBU.

Descriptors: *Eutrophication, *Primary productivity, *Synoptic analysis, *Bioassay, *Remote sensing, *Detergents, Water pollution sources, Aquatic productivity, Zooplankton, Discharge(Water), Periphyton, Aquatic bacteria, Limiting factors, Crayfish, Geomorphology, Sediment transport, Nutrients.
Identifiers: *Lake Tahoe(Calif-Nev), Pacifastacus leniusculus, Mysis relicta.

A 4 1/2-year study on the rate and factors affecting the cultural eutrophication of oligtrophic Lake Tahoe is reported. Primary productivity has increased alarmingly with a steady shift in the seasonal maximum from early spring to late summer. Productivity increased 25.6% from 1968 to 1971. Using the 1959-1960 data from earlier studies, the increase to 1971 was 51%. Diatoms dominate the phytoplankton population and the maximum zone of phytoplankton photosynthesis may be as deep as 50-70 m. The extent of winter mixing is important in the nutrient budget of the lake and bacteria associated with stream-borne nutrients facilitate nutrient regeneration. The littoral zone, although extremely important visually to the lake, contributes only 10% of the total primary production. Great variability in fertility of the lake has been demonstrated by synoptic studies and aerial remote sensing. Highest productivity is found in the lake near tributaries which drain disturbed land. Nutrients associated with road building, housing, and lumbering are major causes of eutrophication in Tahoe. In bioassay studies NTA was found to stimulate primary productivity. Drainage from a sewage land disposal site continues to yield high levels of nitrate, and marinas may serve as nutrient and sediment traps or as eutrophic, isolated systems. Daphnia, an important cladoceran component of the zooplankton population has virtually disappeared from the lake and predation by the introduced zooplankter Mysis relicta and the kokanee salmon are suspect. (EPA)
W75-07691

TAXONOMY AND ECOLOGY OF STENONEMA MAYFILES (HEPTAGENIIDAE:EPHEMEROPTERA),
National Environmental Research Center, Cincinnati, Ohio.
P. A. Lewis.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-241 235, $4.75 in paper copy, $2.25 in microfiche. Report EPA-670/4-74-006, December 1974. 80 p, 203 fig, 4 tab, 60 ref.

Descriptors: *Systematics, *Bioindicators, *Aquatic insects, *Mayflies, Distribution, Water pollution, Benthos, Insects, Limnology, Life cycles, *Ecology.
Identifiers: Insect ecology, *Stenonema mayflies, *Pollution tolerance, Environmental requirements.

Keys and descriptions are provided of all North American species of Stenonema mayflies and information from the leterature is consolidated on their ecology, environmental requirements, and pollution tolerance. Accounts of each species include synonymy, nymphal description, collection records, and a distribution map. The 31 species described and keyed include three recently described species, four new synonyms, two resurrected species, and new combinations involving three additional species and subspecies. Twelve species and one subspecies are classified as intolerant to organic pollution, eight species as tolerant of mild pollution, and seven species and two subspecies as tolerant to moderate pollution. (EPA)
W75-07694

MATHEMATICAL MODELING OF PHYTOPLANKTON IN LAKE ONTARIO 1. MODEL DEVELOPMENT AND VERIFICATION,
Manhattan Coll., Bronx. N.Y. Environmental Engineering and Science Program.
R. V. Thomann, D. M. DiToro, R. P. Winfield, and D. J. O'Connor.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-241 046, $7.00 in paper copy, $2.25 in microfiche. Environmental Protection Agency, Report EPA 660/3-75-005, March 1975. 177 p, 58 fig, 15 tab, 9 ref. 1BA026 R800610.

Descriptors: *Mathematical models, Computer models, Eutrophication, Water quality, Nutrients, Cycling nutrients, Dispersion, Mass transfer, Simulation analysis, Lakes, *Lake Ontario, Great Lakes, *Phytoplankton, Chlorophyll.

The basic mathematical structure for describing the dynamics of phytoplankton in Lake Ontario is presented. Data on chlorophyll and principal nutrients are reviewed and summarized and the mathematical modeling strategy is detailed. The modeling strategy begins with the construction of a horizontally completely mixed lake with vertical layers, LAKE 1. This spatially simplified model is used to develop the interactions and kinetic behavior of the various components of each subsystem. A more detailed 3-dimensional model is then used to describe open lake and near shore variations in phytoplankton biomass. Ten biological and chemical variables are used in both models and include four trophic levels above the phytoplankton, chlorophyll a as a measure of phytoplankton biomass, two phosphorus components and three nitrogen components. Under reasonable sets of model parameters as reported in the literature, the Lake 1 model output compared favorably with observed data on the dependent variables. Spring growth and peak chlorophyll concentrations are related primarily to increasing light and temperature. The model indicates that growth ceases due to phosphorus limitation. The results to date indicate that the mathematical model of phytoplankton in Lake Ontario as developed herein is a reasonable first approximation to observed data. As such, the model can form a basis for preliminary estimates of the effects of nutrient reduction programs on Lake Ontario. (EPA)
W75-07700

THE SEASONAL CYCLE OF GROWTH AND PRODUCTION IN THREE SALT MARSHES ADJACENT TO THE SAVANNAH RIVER,
Skidaway Inst. of Oceanography, Savannah, Ga.
For primary bibliographic entry see Field 2L.
W75-07713

PERIODICITY, IDENTIFICATION, AND CONTROL OF ALGAE IN MANAGED PONDS,
University of Southern Mississippi, Hattiesburg. Coll. of Science and Technology.
A. N. Fleming.
Publication No MSGP-73-019, August 1973. 171 p, 9 fig, 16 tab, ref. (Master's Thesis). NOAA Grant OSG 2-35362.

Descriptors: *Algae, *Nuisance algae, *Phytoplankton, *Chlorophyta, Aquatic life, Algal control, Aquatic weed control, Aquatic algae, Algal toxins, Algal poisoning, Algicides, Copper sulfate, Aquatic life, Aquatic plants, Diatoms, Fish farming, Fish hatcheries, Fisheries, Life cycles, Growth rates, Growth stages.
Identifiers: *Seasonal variations, *Periodicity.

The seasonal variation, periodicity, and relative abundance of six divisions of algae occurring at a commercial and federal fish hatchery were investigated every two weeks from April, 1971 through May, 1972. Chemical and physical factors, which include dissolved oxygen, pH, hardness, temperature, phosphorus, and nitrogen were correlated with phytoplankton production, periodicity, and seasonal variation. A temperature differential of 4 to 5C between the hatcheries did not reflect any major differences in phytoplankton diversity, although phytoplankton periodicity was directly related to temperature. The majority of phytoplankton found at the hatcheries consisted of green algae with diatoms and other chrysophytes, usually the co-dominant algae. (NOAA)
W75-07719

ISOLATION OF EDWARDSIELLA TARDA FROM AQUATIC ANIMAL SPECIES AND SURFACE WATERS IN FLORIDA,
Florida Univ., Gainesville. Dept. of Veterinary Science.
For primary bibliographic entry see Field 5A.
W75-07735

DISTRIBUTION OF COLIFORM BACTERIA IN THE COASTAL WATER, (IN JAPANESE),
Tokai Univ., Tokyo (Japan). Coll. of Marine Science and Technology.
For primary bibliographic entry see Field 5B.
W75-07744

DYNAMICS AND PRODUCTIVITY OF PHYTOPLANKTON AND PELAGIC BACTERIA IN A HIGH MOUNTAIN LAKE (ANTERIOR FINSTERTAL LAKE, AUSTRIA), (IN GERMAN),
Innsbruck Univ. (Austria). Inst. of Zoology.
M. Tilzer.
Arch Hydrobiol Supplementb. Vol 40, No 3, p 201-273. 1972, Illus, English summary.

Descriptors: *Phytoplankton, *Biomass, Lakes, *Primary productivity.
Identifiers: Pelagic bacteria, *Austria.

The phytoplankton was dominated by motile nannoplanktonic algae; Gymnodinium uberrimum was the most important species during 1970 comprising an average of 57% of the biomass. Phytoplankton fresh weight was lowest in spring and highest in summer. Pelagic bacterial biomass was unexpectedly high, following the fluctuations of the phytoplankton biomass with a lag of 4-6 wk. The most important pre-selections for phytoplankton were low nutrient requirements and high adaptability of changing light intensities and partly by phototactic vertical migrations. Perennation is due to endurance of photosynthesis below ice, low metabolism and probably storage of nutrients. Primary productions rates (mean: 4 mgC.m-3 . d-1) vary in a wide range (0.07 in Mar., 19 mgC . m-3 . d-1 in Sept.). Light inhibition in early summer is considerable and causes downward migration of the motile species whereas immobile forms prefer low light periods. Bacteria seem to be the only heterotrophic producers in winter. The ratio heterotrophic to autotrophic CO2 uptake varies from 3:1 (Mar.) to 0.03:1 (early summer). Internal and external losses of biomass are increased with the absolute values of production rates. Plankton tends to an equilibrium between assimilation on the one, consumption and decomposition on the other side. Compared with Lake Erken (Sweden) metabolic processes are slowed down by the factor 5.--Copyright 1973, Biological Abstracts, Inc.
W75-07745

ROLE OF CRUCIAN CARP IN TRANSMISSION OF ENTERIC PATHOGENS, (IN KOREAN),
Catholic Medical Coll., Seoul (Republic of Korea). Dept. of Preventive Medicine.
For primary bibliographic entry see Field 5B.
W75-07747

LIMNOLOGICAL TRANSPORT AND FOODSTUFF MODELS (IN GERMAN,
D. M. Imboden.
Schweiz Z Hydrol. Vol 35, No 1, p 29-68, 1973, Illus, English summary.

Descriptors: *Lakes, Limnology, *Mathematical models, *Eutrophication, Epilimnion, Hypolimnion, Nutrients.

Physical and biochemical processes have a significant influence on the material balance of a lake. Mathematical concepts are developed to treat transport phenomena with which a comparison of different lakes is possible. A 2-box model consisting of the subsystems epilimnion and hypolimnion, for lakes with 1 specific limiting nutrient factor (e.g., phosphorus) is employed to evaluate eutrophication processes. In particular, a theoretical basis for Vollenweider's empirical relation between specific P loading and the trophic state is presented. The heterogenous O2-consumption in the deep part of the lake during summer stagnation is calculated with diffusion theory.--Copyright 1974, Biological Abstracts, Inc.
W75-07751

STUDIES ON EFFECTS OF THERMAL POLLUTION IN BISCAYNE BAY, FLORIDA,
Rosenstiel School of Marine and Atmospheric Science, Miami, Fla.
M. A. Roessler, and D. C. Tabb.
For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington, D.C. 20402, Price $5.75 in paper copy, $2.25 in microfiche from NTIS as PB-239 328. Environmental Protection Agency, Ecological Research Series Report EPA-660/3-74-014. August 1974. 145 p, 37 fig, 16 tab, 73 ref, append. EPA Grant WP-0135-01A, Project 18080 DFU.

Descriptors: *Thermal pollution, *Water pollution effects, *Environmental effects, *Estuaries, Heated water, *Florida.
Identifiers: Waste heat, Biscayne Bay(Fla).

Field studies on the effects of thermal additions from the Florida Power and Light Company's discharge at Turkey Point have been conducted to determine the effects of this effluent on the macroinvertebrates and fishes of the area. Replicate samples with a 3 m (10 foot) otter trawl lined with .63 mm (1/4 in.) bar mesh were obtained monthly at 20 stations. Data on temperature, salinity and oxygen were collected during each sampling period. Additional chemical data were collected when opportunity existed. The experimental results suggest that maximum summer discharge temperatures should not exceed 33C in order to avoid deterimental changes in the environment. Intermittent flow of discharge water is not as damaging as constant flow. Card Sound appears to be as productive as Biscayne Bay and temperatures exceeding 33C will also cause damage in Card Sound. (EPA)
W75-07790

METHYLMERCURY POISONING IN IRAQ,
Baghdad Univ. (Iraq).
F. Bakir, S. F. Damluji, L. Amin-Zaki, M. Murtadha, and A. Khalidi.
Science, Vol 181, p 230-240, July, 1973, 7 fig, 4 tab, 15 ref. NSF (RANN) (GI-300978) NIGMS (GM-15190) and (GM-01781).

Descriptors: *Mercury, *Poisoning, *Human pathology, *Wheat, Constraints, Fish, Exposure, Water pollution, Epidemics, Toxicity, Distribution, Regression analysis, Tissues, Urine, Ingestion, Analytical techniques, Laboratory tests, Mortality, Spectroscopy, Environmental effects, Laboratory animals.
Identifiers: *Methylmercury, *Iraq, Hair, Inhalation.

The effect on humans of the epidemic of methylmercury poisoning by contaminated grin in Iraq was studied. Urine, hair, tissue extracts and blood samples were examined for mercury content. Comparisons were made of infants, born and unborn, males and females, children and adults. Urine measurement for mercury concentration is of no value as a guide to the amount of mercury to which a person had been exposed. The concentration of methylmercury in the blood is the best indicator of the body burden in people exposed to methylmercury. The measurement of mercury content in the hair is the best means for determining the history of exposure. The rate of blood clearances from mercury contamination varies individually. Methylmercury is transferred into milk at a concentration equal to 3 per cent that of blood. The clearance of mercury from blood may be accelerated by oral administration of D penicillamine and thiol resin. Methylmercury was identified as the causative agent of poisoning. Constraints are outlines to avoid further epidemics. (Rowe-Vanderbilt)
W75-07797

EFFECT OF DIETARY SELENIUM AND AUTOXIDIZED LIPIDS ON THE GLUTATHIONE PEROXIDASE SYSTEM OF GASTROINTESTINAL TRACT AND OTHER TISSUES IN THE RAT,
California Univ., Davis. Dept. of Food Science and Technology.
K. Reddy, and A. L. Tappel.
Journal of Nutrition, Vol 104, No 8, p 1069-1078, August, 1974. 2 fig, 5 tab, 39 ref.

Descriptors: *Toxins, *Lipids, *Path of pollutants, *Animal metabolism, *Animal pathology, Environmental effects, Metals, Pollutants.
Identifiers: *Selenium.

The effect of dietary selenium on the detoxification of dietary peroxides via the glutathione peroxidase system was studied. Rats were fed Torula yeast-based selenium-deficient diets with either 15% fresh tocopherol-stripped corn oil or 15% autoxidized corn oil with a peroxide value of 692 mEq/kg. Rats fed these two diets were further divided into groups that were fed either 0 or 2 ppm selenium as selenomethionine. Body weight gain of the two groups of rats fed the autoxidized oil was significantly lower than that of the two groups fed fresh corn oil. The specific activity of glutathione peroxidase in various regions of the gastrointestinal tract, liver, blood and adipose from selenium-supplemented rats was significantly higher than in these tissues from the non-supplemented rats. In the rats not supplemented with selenium, blutathione peroxidase activity was significantly increased in the group fed autoxidized corn oil; increased activity was not observed in tissues of selenium-supplemented rats fed peroxides. With few exceptions, glutathione reductase activity was the same in tissues from each of the four dietary groups. Significantly more peroxide accumulated in the adipose of the peroxide-fed rats not supplemented with selenium than in the adipose of the other three groups. (Pulliam-Vanderbilt)
W75-07801

MICROBIOLOGICAL FOULING AND ITS CONTROL IN COASTAL WATER AND THE DEEP OCEAN,
Woods Hole Oceanographic Institution, Mass.
For primary bibliographic entry see Field 5A.
W75-07825

CLAVICEPS PURPUREA ON SPARTINA IN COASTAL MARSHES,
Gulf Coast Research Lab., Ocean Springs, Miss.
L. N. Eleuterius, and S. P. Meyers.
Reprinted from Mycologia, Vol LXVI, No 6, p 978-986, Nov.-Dec. 1974.

Descriptors: *Fungi, *Plant diseases, Marsh plants, Aquatic plants, *Marshes, *Parasitism, Ecosystems, Estuaries, Estuarine environment, Germination.
Identifiers: *Claviceps purpurea, *Spartina alterniflora, *Ergot, *Marsh grass, Marshland vegetation, Sclerotia, Infection intensity, Gulf Coast, Spartina patens, Spartina cynosuroides.

The ergot fungus Claviceps purpurea was found on Spartina alterniflora throughout Gulf and Atlantic coastal marshes. Spartina patens and Spartina cynosuroides were also collected bearing sclerotia of C. purpurea. Observations on the intensity of infection are reported, with notably heavy infection apparent in regions of spoil deposits. Conditions for germination of sclerotia are given along with some details of stromal morphology. Implications of C. purpurea in salt marsh ecosystems are discussed. (NOAA)
W75-07827

CONTRIBUTION OF FUNGI TO BIODEGRADATION OF SPARTINA AND OTHER BRACKISH MARSHLAND VEGETATION,
Louisiana State Univ., Baton Rouge. Dept. of Food Science.
S. P. Meyers.
Reprinted from Veroff. Inst. Meeresforsch. Bremerh. Suppl. 5. p 357-375, 1974. NOAA Grant OSG 2-35231.

Descriptors: *Biodegradation, *Microbial degradation, Marsh plants, *Fungi, Marshes, Molds, Yeasts, Aquatic plants, Plant diseases, Detritus, Ecosystems, Estuaries, Estuarine environment, Growth stages, Deterioration, Degradation(Decomposition), *Louisiana, *Coastal marshes.
Identifiers: *Spartina alterniflora, Marshland vegetation, *Marsh grass, Mycota, Fusarium, Cephalosporium, Lulworthia, Leptosphaeria, Fungal attack, Pichia spartinae, Kluyveromyces drosophilarum.

Transformation of marsh grass, Spartina alterniflora, to detritus is an initial energy transfer step in the coastal Louisiana estuarine ecosystem. Spartina is systematically attacked by a selective mycota throughout its development and decomposition. Fungi include, among others, species of Fusarium and Cephalosporium as well as representatives of the marine taxa Lulworthia and Leptosphaeria. Molds colonizing external plant surfaces differ from those isolated within the culm. Fungal attack is correlated with seasonal development and subsequent decomposition of the plant. A large yeast biomass, notably sporogenous taxa Pichia spartinae and Kluyveromyces drosophilarum, is prevalent in the oxidized portions of the Spartina rhizosphere and within the peripheral tissue and intercellular spaces of the culm. These species, with strong B-glucosidase activity, reach maximal populations during dieback of Spartina. A mutualistic yeast/mold association in turnover of plant substrates is suggested. (NOAA)
W75-07828

5D. Waste Treatment Processes

USE OF ENVIRONMENTAL ANALYSES ON WASTEWATER FACILITIES BY LOCAL GOVERNMENT,
Teknekron, Inc., Washington, D.C. Applied Research Div.
J. C. Fensterstock, and D. M. Speaker.
For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 Price $2.70. Environmental Protection Agency, Report EPA-600/5-74-015, July 1974. 193 p, 10 fig, 7 append. EPA Program Element HA095, R/T21 ART-06. Contract 68-01-1898.

Descriptors: Analysis, Evaluation, *Institutional constraints, Administrative agencies, Water resources development, On-site investigations, *Waste water treatment, *Local governments, *Treatment facilities, Environment.

Environmental analyses (assessments, impact statements, negative declarations, appraisals, etc.) on wastewater treatment facilities to be constructed in four case study areas were reviewed. Environmental analyses reflected Council of Environmental Quality (CEQ) and EPA guidelines in force during 1970 and 1972. Case examples were selected to ensure representation of jurisdictional patterns, settings, and availability of environmental analyses. The study reviewed decision-making processes of local and state governments. The study identified and detected several types of problems, both substantive and procedural. They were: inadequate environmental orientation of staffs; exclusion of lay public input; intra/inter-organizational conflicts; inadequate guidelines; and timing of environmental analyses for local consideration of consequences. Recommendations included: legislative changes; Federal funding for staff training programs; definitive guidelines for organizational structuring; and suggestions to increase lay public participation during the planning and decision-making processes. (Scherer-EPA)
W75-07360

INFLUENCES OF WASTEWATER MANAGEMENT ON LAND USE: TAHOE BASIN 1950-1972,
California Univ., Santa Cruz.
J. E. Pepper, and R. Jurgenson.
For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 Price $2.50. Environmental Protection Agency, Report EPA-600/5-74-019, October 1974. 167 p, 18 fig, 46 tab, 267 ref, 5 append. EPA Program Element IHA095, R/T 21AZC/03. Contract No. 68-01-1842.

Descriptors: *Treatment facilities, *Waste water treatment, *Land use, California, Nevada, Water quality control, *Management, Water pollution effects.
Identifiers: *Lake Tahoe basin(Nev-Calif).

Statistical analysis indicates that wastewater infrastructure projects have had a significant influence on the land use pattern in the Lake Tahoe Basin. Land use densities have increased immediately following the expansion of plant capacities in areas serviced by three of the four major wastewater treatment facilities. The subdivision approval rate of raw land was also found to be a function of anticipated treatment capacity. Federal and state water quality agencies played an active and central role in wastewater management programs designed to remove the threat of water pollution at Lake Tahoe. Cooperation among all levels of government led to expeditious resolution of the water quality problem in spite of the numerous geographic, economic and political constraints in the region. However, the provision of sewerage facilities also removed land development constraints. Local governments, acting without coordinated land use policies, permitted intensive land uses which could not have occurred with septic tank treatment. These increases in land use have subsequently produced major environmental problems in the Tahoe Basin. Thus, the singular focus on water quality led to unforeseen environmental impacts resulting from the land use changes made possible by the provision of extensive sewerage systems. (Kibby-EPA)
W75-07362

WATER QUALITY MODELING BY MONTE CARLO SIMULATION,
Maine Univ., Orono. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W75-07386

STOCHASTIC WATER QUALITY CONTROL BY SIMULATION,
Texas Univ., San Antonio. Div. of Environmental Studies.
For primary bibliographic entry see Field 5B.
W75-07389

DYNAMIC PROGRAMMING FOR OPTIMAL CAPACITY EXPANSION OF WASTEWATER TREATMENT PLANTS,
Case Western Reserve Univ., Cleveland, Ohio. Systems Engineering Div.
M. A. Kaplan, and Y. Y. Haimes.
Water Resources Bulletin, Vol 11, No 2, p 278-293, April 1975. 4 fig, 1 tab, 13 equ, 15 ref.

Descriptors: *Waste water treatment, *Long-term planning, *Operation and maintenance, *Dynamic programming, Optimization, Costs, Capital costs, Scheduling, Methodology, Constraints, Equations, Computer programs, Mathematical models, Systems analysis, Treatment facilities, *Ohio.
Identifiers: *Capacity expansion, *Cost minimization, *Miami River basin(Ohio).

Presented is a dynamic programming procedure for the planning and operation of a wastewater treatment plant over a long period of time. In order to meet increased demands for wastewater treatment in the future, the expansion of existing plants is considered. Dynamic programming is used to determine the optimal schedule of expansion at each plant, simultaneously deriving an optimal operating policy (treatment level). The planning objective is to minimize the long-term cost of wastewater treatment, the present value of construction costs along with operating, maintenance, and replacement costs and effluent charges, if any. It is assumed that the capacity of any plant is monotonic non-decreasing and that the capacity of treatment plants may be expanded only by adding discrete increments. The optimal timing of capacity expansion at each plant depends on: (1) the shape of the projected wastewater demand function; (2) the interest rate used; (3) the locations and capacities of the facilities available; and (4) the rates of increase of the costs of construction, labor, chemicals, and electric power. An example illustrating the use of the procedure is presented. (Bell-Cornell)
W75-07390

AUTOMATED ANALYSIS OF INDIVIDUAL REFRACTORY ORGANICS IN POLLUTED WATER,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5A.
W75-07404

PROBLEMS AND POTENTIALS OF RECYCLING WASTES FOR AQUACULTURE,
Massachusetts Inst. of Tech., Cambridge. Sea Grant Project Office.
J. Kildow, and J. E. Huguenin.
Report No. MITSG 74-27, December 30, 1974, 170 p, 3 fig, 10 tab, 149 ref, 5 append. NOAA OSG NG-43-72.

Descriptors: *Aquaculture, *Effluents, *Wastes, *Sewage, *Recycling, Feeds, Waste disposal, Food chains, Carcinogens, Fishing, Seafood, Tolerances, Toxic tolerances, Public health, Contamination, Management analysis, Law, Food adulteration, Food contamination, Marketing, Product development.
Identifiers: Secondary sewage, Thermal waste, Thermal effluents, Delaney Amendment, Consumer attitudes, Product design.

The potentialities and problems of using thermal effluents and/or secondary sewage as inputs to a marine aquaculture system are described. The demand on Coastal Zones for both waste disposal and food production is complimented by the rising feed cost for raising fish and farm animals. In examining the advantages of a waste-food recycle system, current and foreseeable problems, especially those dealing with biological, social, political and legal matters, become more recognizable and solutions obtainable. Economic planning, institutions, consumer acceptance of waste-grown seafoods and marketing strategies are discussed. (NOAA)
W75-07416

THIRTY-FIVE YEARS OF CONTINUOUS DISCHARGE OF SECONDARY TREATED EFFLUENT ONTO SAND BEDS,
Rensselaer Polytechnic Inst., Troy, N.Y. Dept. of Environmental Engineering.
For primary bibliographic entry see Field 5B.
W75-07442

THE SEPTIC TANK'S ROLE IN LAND USE,
Oregon State Dept. of Environmental Quality, Portland.
R. D. Jackman.
In: Land and Water Use in Oregon; Seminar conducted by Oregon State University, Spring Quarter 1974, Water Resources Research Institute, Corvallis, Oregon, p 69-75, July 1974. 2 fig, 7 ref.

Descriptors: *Septic tanks, *Waste water treatment, *Administrative agencies, *Cities, City planning, Planning, Legislation, Legal aspects, Community development, Sewers, Sewage treatment, Disposal, Domestic wastes, Soil disposal fields, Water pollution sources, *Oregon.

The septic tank system, or subsurface sewage disposal system, is the method most commonly used for individual household disposal of domestic sewage where no community sewerage system is available. Until now, we have miserably failed to recognize the low-density limitations of septic-tank systems. They have been permitted in the past in high density suburban developments on tiny lots without adequate replacement areas and no real hope for sewers. The septic tank has been the excuse for procrastination in implementing strong land use planning and zoning in Oregon. The Legislature enacted 1973 House Bill 2786 to authorize the Department of Environmental Quality (DEQ) to develop rules and regulations for alternative systems to the septic tank system. DEQ is administering the subsurface sewage program of 25 counties by memoranda of agreement and of 11 counties directly through DEQ's five Regions and three Branch Offices. Oregon is beginning to plan ahead and not by default. DEQ works with developers and, for a fee, investigates the development for sewage disposal and provides a report so the applicant may have his subdivision approved and sell lots. (See also W75-07507) (Sims-ISWS)
W75-07514

REDUCTION OF WASTEWATER FOAMING BY PROCESS CHEMICAL SUBSTITUTION,
Virginia Polytechnic Inst. and State Univ., Blacksburg.
C. W. Randall.
Environmental Protection Agency, Washington, D.C., Technology Transfer Program. Paper presented at the Industry Seminars for Pollution Control, Atlanta, Georgia, September 25-26, 1973. pp 111-117, 3 tab.

Descriptors: *Industrial wastes, *Textiles, *Foaming, *Waste water treatment, *Activated sludge, *Aerated lagoons, Settling basin, Chemical properties, Aeration, Aerobic bacteria, Bacteria, Biological treatment, Flocculation, Sludge treatment.
Identifiers: Process chemical substitution.

One of the most commonly occurring problems associated with the treatment of textile dyeing and finishing wastewaters is excessive foaming. Excessive foaming may seriously affect the efficiency of wastewater treatment when biological processes, such as activated sludge, that require a large amount of agitation and aeration are used. A case history is given of a waste treatment situation wherein excessive foaming problems had to be solved by in-plant process chemical change before reliable operation and treatment could be accomplished. In an attempt to provide treatment in compliance with pollution control regulations, an extended aeration activated sludge system was designed and installed. As the biological solids grew in the lagoon, the major portion became entrapped in the generating foam, were floated to the surface, and eventually dumped in a circular pile on the apron surrounding the lagoon. The initial attempt at solving the problem consisted of hosing the biological solids back into the lagoon. The second solution attempted was the use of defoaming agents. To achieve a reduction of the foaming during wastewater treatment through process chemical substitution, it was necessary to reduce the high foaming materials in the dye bath. Not only did the chemical changes solve the spotting and foaming problems, they also decreased the chemical costs. (Poertner)
W75-07591

TREATING FINISHING WASTE CHEMICALLY AND BIOLOGICALLY,
Virginia Polytechnic Inst. and State Univ., Blacksburg.
C. W. Randall, and P. H. King.
American Dyestuff Reporter, June 1973, p 63-87. 8 fig, 2 tab, 7 ref.

Descriptors: *Textiles, *Dyes, *Color reactions, *Industrial wastes, *Biological treatment, *Waste water treatment, *Effluents, Coagulation, Flocculation, Organic wastes, Treatment facilities, Neutralization, Aerated logoons, Settling basin, Sludge, Dissolved oxygen.
Identifiers: Color removal, Textile manufacturing wastes.

Full-scale plant operating data are presented that illustrate the efficacy of a combined chemical-biological treatment process for removal of both color and organic matter from a concentrated textile dyeing and finishing waste. The basic premise in operating the waste treatment plant is that chemical treatment is best for color removal and biological treatment is optimum for reduction of organic matter. The combination of the two types of processes results in a high degree of treatment and the discharges of an effluent which is esthetically acceptable and does not cause a stress on the oxygen resources of the receiving stream. The operating data indicate that the use of excess lime as a primary coagulant for color removal is entirely satisfactory provided attention is given to the need for some chemical aid to condition the floc, and thus enable it to be separated out in a sedimentation basin. A long-chain anionic polyelectrolyte is the optimum floc conditioning chemical for lime flocs. The performance of aerated lagoons for removal of organic matter from industrial wastes is temperature dependent. In designing these units, consideration should be given to this problem. (Poertner)
W75-07592

DEVICES FOR ONBOARD TREATMENT OF WASTES FROM VESSELS,
Thiokol Chemical Corp., Brigham City, Utah. Wasatch Div.
T. J. O'Grady, and P. E. Lakomski.
Environmental Protection Agency, Report EPA-670/2-74-091, December 1974. 117 p, 30 fig, 13 tab, 2 append. 1BB038; ROAP 21APK; Task 18. EPA Contract 68-01-0115.

Descriptors: *Sewage treatment, *Waste water treatment, Sludge disposal, Tertiary treatment, Ships, Recycling, *Filtration, Water quality standards, *Incineration, Chlorination, Cost analysis.
Identifiers: *Zero discharge waste treatment, Physical/chemical treatment, *Filter-incinerator, Waste water recycle.

A program involving the demonstration of a pleasure craft zero discharge, physical/chemical waste treatment system employing a unique filter-incinerator device was conducted. Extensive test data from laboratory and shipboard demonstration tests of the system are presented. Data on manufacture and installtion costs for the pleasure craft are also presented. The program demonstrated the ability to zero discharge waste and comply with the 23 June 1972 EPA no-discharge standard. A device combining two unit operations (filtration and incineration) will effectively and safely remove and destroy sewage sludge. With minor modifications, the pleasure craft waste treatment system will meet Coast Guard requirements for commercial vessels. (EPA)
W75-07594

RECOVERY AND REUSE OF COAGULANTS FROM TREATMENT OF WATER AND WASTEWATER,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Civil Engineering.
P. H. King, G. H. H. Chen, and K. R. Weeks, Jr.
Available from the National Technical Information Service, Springfield, Va. 22161 as PB-241 742, $4.25 in paper copy, $2.25 in microfiche. Virginia Water Resources Research Center, Blacksburg, VPI-WRRC-Bulletin 77, March 1975, 58 p, 20 fig, 1 tab, 29 ref. OWRT A-040-VA(3).

Descriptors: *Water treatment, Coagulation, Sludge disposal, *Waste water treatment, Water reuse, Aluminum, Iron compounds, Computer models, Capital costs, Metals, Chemical precipitation, Dewatering, Separation techniques.
Identifiers: Alum recovery, *Chemical reuse, *Coagulant recovery, *Iron salts.

In laboratory experiments, procedures were tested for economical recovery of hydrolyzed metallic coagulants used in treatment of polluted surface waters and selected wastewater discharges. Investigations focused on treatment systems using aluminum and iron salts as coagulants and precipitants. The experiments sought answers to how much coagulant can be recovered, what is the best means of separating and dewatering the remaining solids, and how effective is the recovered coagulant during reuse. An economic analysis estimated the capital cost of implementing the process, and determined what savings may be expected in chemical costs. A computer model was developed for determining the economic break-even point with reference to treatment plant capacity. Research findings indicate that recovery of both aluminum and iron salts is technically feasible, though the potential for aluminum recovery appears greater. Among additional benefits from the process described are large reductions in sludge volume and improved settleability and filterability of the remaining sludge. Laboratory tests indicate that the efficiency of recovered metal in coagulating suspended solids is not materially reduced from that of fresh coagulant.
W75-07600

CHARACTERIZATION AND TREATMENT OF URBAN LAND RUNOFF,
North Carolina Water Resources Research Inst., Raleigh.
N. V. Colston, Jr.
Environmental Protection Agency, Cincinnati, Ohio, Report EPA-670/2-74-096, December 1974. 157 p, 70 fig, 73 tab, 8 ref. 1BB034/ROAP:21-ATB/TASK:014. 11030 HJP.

Descriptors: Runoff, Surface drainage, *Water pollution sources, Flocculants, *Waste water treatment, Water quality, Coagulation, Computers, *Urban runoff, *Storm runoff, Storm water, *Urban drainage, Model studies, *North Carolina, Regression analysis.
Identifiers: Storm water management model, Durham(NC).

Urban land runoff from a 1.67 square-mile urban watershed in Durham North Carolina, was characterized with respect to annual pollutant yield. Regression equations were developed to relate pollutant strength to hydrograph characteristics. Urban land runoff was a significant source of pollution when compared to the raw municipal waste generated within the study area. On an annual basis, the urban runoff yield of COD was equal to 91 percent of the raw sewage yield, the BOD yield was equal to 67 percent, and the urban suspended solids yield was 20 times that contained in raw municipal wastes for the same area. Downstream water quality was controlled by urban land runoff 20 percent of the time. In urban drainage basins, investments in upgrading secondary municipal waste treatment plants without concomitant steps to moderate the adverse effects of urban land runoff are questionable in view of the apparent relative impact of urban land runoff on receiving water quality. (EPA)
W75-07607

EXTENDED AERATION SEWAGE TREATMENT IN COLD CLIMATES,
Environmental Protection Agency, College, Alaska. Arctic Environmental Research Lab.
H. J. Coutts, and C. D. Christianson.
Report EPA-660/2-74-070, December 1974. 80 p, 26 fig, 15 tab, 36 ref 1 BB044.

Descriptors: *Waste water treatment, *Sewage treatment, Biological treatment, Temperature, Activated sludge, Cold regions, Aeration, Subarctic, Alaska, Domestic sewage, Coliforms, Nutrients.
Identifiers: Extended aeration, Clarification, Organics.

In an effort to develop design criteria for biological treatment of low temperature domestic sewages, two parallel low temperature extended aeration units were designed and operated near Fairbanks, Alaska. The two units has exposed aeration basins utilizing submerged aerators and were differentiated by type of clarifier. One unit had conventional horizontal flow clarifier while the other had a modified upflow clarifier with tube settlers. The liquid temperature varied from 0C to 19C. In addition, 0.5 MGD subarctic, oxidation ditch and low temperature bench scale units were studied. Organic loading was the parameter most seriously affected by low temperatures. BOD removals above 80% at liquid temperatures below 7C could generally be maintained at loadings of 0.08 Kg BOD/Kg MLSS/Day or less. As in warmer climates, intentional sludge wastage was required. Low temperature solids accumulation rates indicated that standard wastage criterion of 0.5 Kg SS/Kg BOD is usually adequate. Other parameters investigated and reported were: (1) aeration for oxygen transfer and mixing; (2) comparative clarifier performance; (3) nutrient and total coliform removals. (EPA)
W75-07608

DEVELOPMENT OF AN APPROACH TO IDENTIFICATION OF EMERGING TECHNOLOGY AND DEMONSTRATION OPPORTUNITIES,
Battelle Columbus Labs., Ohio.
For primary bibliographic entry see Field 5G.
W75-07617

RESEARCH ON PIEZODIALYSIS - FOURTH REPORT,
Ionics, Inc., Watertown, Mass.
For primary bibliographic entry see Field 3A.
W75-07621

RESEARCH ON PIEZODIALYSIS - FIFTH REPORT,
Ionics, Inc., Watertown, Mass.
For primary bibliographic entry see Field 3A.
W75-07622

TUBULAR REVERSE OSMOSIS MEMBRANE RESEARCH,
Philco-Ford Corp., Newport Beach, Calif. Aeronutronic Div.
For primary bibliographic entry see Field 3A.
W75-07623

DEVELOPMENT OF IMPROVED PBI MEMBRANE SYSTEMS FOR WASH WATER RECYCLING AT PASTEURIZATION TEMPERATURES,
Celanese Research Co., Summit, N.J.
J. E. Poist, and F. S. Model.
Available from the Nationat Technical Information Service, Springfield, Va 22161, as PB-236 939, $4.25 in paper copy, $2.25 in microfiche. Report INT-OSW-RDPR-74-995, July 1974. 52 p, 14 tab, 18 fig, 5 ref. OWRT Contract 14-30-3112.

Descriptors: *Reverse osmosis, *Membranes, *Separation techniques, Pressure, Semipermeable membranes, Filters, Filtration, Permeability, *Recycling, Waste water treatment, Desalination, *Water reuse.
Identifiers: *Wash water, Polybenzimidazole membranes, *Pasteurization, Sterilization, Urea rejection, Detergent rejection, Soap rejection, Lactic acid rejection, Spiral wound module, Flat sheet tests.

The important variables in preparation of asymmetric RO flat sheets of PBI membrane have been identified and optimized. The resultant preparative procedure has been scalled up to yield production sheets (11.5 in x 36 in x .008 in) of this PBI membrane. Finally, the large PBI sheets have been fabricated successfully in-house into prototype spiral wound modules capable of processing wash water feed at 75C. (OWRT)
W75-07624

OPERATION AND EVALUATION OF ALUMINUM TUBED MSF-VTE-HTE PILOT PLANT AT WRIGHTSVILLE BEACH TEST FACILITY,
Reynolds Metals Co., Richmond, Va.
For primary bibliographic entry see Field 3A.
W75-07625

DEVELOPMENT OF FORCED FLOW ELECTRODESALINATION SEPARATOR MATERIALS,
Aqua-Chem, Inc., Milwaukee, Wis.
For primary bibliographic entry see Field 3A.
W75-07626

REVERSE OSMOSIS FOR SPACECRAFT WASH WATER RECYCLING, MEMBRANE COUPON AND MODULE EVALUATIONS,
McDonnell-Douglas Astronautics Co. West, Huntington Beach, Calif.
G. W. Wells, and R. E. Shook.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-236 941, $6.25 in paper copy, $2.25 in microfiche. Report INT-OSW-RDPR-74-999, July 1974. 159 p, 31 fig, 31 tab, 5 ref. OWRT Contract 14-30-3062.

Descriptors: *Reverse osmosis, *Membranes, *Separation techniques, *Desalination, *Filtration, Water quality standards, Pollutant identification, Recycling, Water reuse, *Waste water treatment.
Identifiers: *Composite membranes, Cellulose acetate, Pasteurization, Sterilization, Ethyl cellulose, Plasma-formed membranes, Urea rejection, Lactic acid rejection, *Wash water.

An 80 gpd RO module was evaluated in a 12-week test program; it successfully recovered water meeting National Academy of Sciences and National Research Council standards from simulated space mission water. The results of the membrane coupon tests indicated that the composite membranes appeared to be most promising for use in spacecraft wash water recovery at 165F. (OWRT)
W75-07627

REVERSE OSMOSIS FOR SPACECRAFT WASH WATER RECYCLING, HIGH PRESSURE PUMP DEFINITION,
McDonnell Douglass Astronautics Co.-West, Huntington Beach, Calif.
For primary bibliographic entry see Field 8C.
W75-07628

MANAGEMENT, OPERATION AND MAINTENANCE BRACKISH WATER TEST FACILITY - ANNUAL REPORT 1973 ROSWELL, NEW MEXICO MAY 1, 1972 - OCTOBER 31, 1973,
Burns and Roe Construction Corp., Paramus, N.J.
For primary bibliographic entry see Field 3A.
W75-07629

APPRAISAL OF SALINE WATER IN OKLAHOMA AND ITS FUTURE DEVELOPMENT THROUGH DESALTING,
Oklahoma Water Resources Board, Oklahoma City.
For primary bibliographic entry see Field 3A.
W75-07630

ECONOMIC FEASIBILITY OF DESALTING SYSTEMS FOR MUNICIPAL WATER SUPPLY IN IOWA,
Dewild Grant Reckert and Associates, Des Moines, Iowa.
For primary bibliographic entry see Field 3A.
W75-07631

DEVELOPMENT OF A COAL-BASED SEWAGE-TREATMENT PROCESS.
Office of Coal Research, Washington, D.C.
For Sale by: Superintendent of Documents, U.S. Government Printing Office, Wash., D.C. 20402 - Price $5.75. Final Report, OCR Research and Development Report No. 55, (1975). 488 p, 56 fig, 77 tab. 14-01-0001-483.

Descriptors: *Waste water treatment, *Sewage treatment, Waste treatment, Suspended solids, *Filtration, *Incineration, Coals, Pilot plants, Tertiary treatment, Effluents, Design data, Treatment facilities, Costs, Industrial water.
Identifiers: *Coal-based sewage treatment, *Coal filtration, Chemical treatment.

Coal has been found to be valuable as a medium for sewage-treatment. Suspended solids can be removed by coal filtration, with partial removal of dissolved matter by physical and chemical reactions on coal. The coal-sewage wastes are incinerated directly with the recovery of heat. A coal-sewage treatment process has been developed through the pilot plant stage and is recommended for post, or 'tertiary' treatment of secondary sewage plant effluent and for industrial use. Design data and cost estimates are given. The average filter flow rate in the treatment of raw sewage is 0.35 gallons per square foot of filter per minute at 15 feet of head. At this flow rate, the tank area required for a given flow of sewage is approximately half that required for normal secondary treatment. The filter flow rate in the post-treatment of secondary treatment plant effluent is 1.0 gallon per square foot per minute at 16 feet of head. In the treatment of raw sewage the consumption of sized filter bed coal, including the filter bed residue, is approximately 9.20 tons per million gallons. In the post-treatment of secondary effluent the coal consumption is approximately 1.32 tons per million gallons.
W75-07632

EFFLUENT TREATMENT IS SPECIALIST'S WORK,
Van Luven Consultants Ltd., Montreal (Quebec).
R. Van Soest.
Pulp and Paper Canada, Vol 76, No 1, p 70-71, January 1975. 2 fig, 2 ref.

Descriptors: *Pulp wastes, *Waste water treatment, *Treatment facilities, Biological treatment, Pulp and paper industry, Canada, Foreign countries, North America, Europe, United States, Industrial wastes, Waste treatment, Pollution abatement, Water pollution control.
Identifiers: *Zurn-Attisholz process, Switzerland.

The acceptance by the Canadian pulp and paper industry of the Zurn-Attisholz process (a two-stage high-rate biological system developed by Cellulose Attisholz AG in Switzerland) for treating pulp and paper mill wastes, is discussed. A brief description of the process is included. It has as yet not been accepted in Canada, but has been used successfully in Europe and the U.S.A. (Sykes-IPC)
W75-07633

STUDY OF THE RELATION BETWEEN RESIDUAL SODA AND WATER-EXTRACTABLE COMPONENTS OF VACUUM DRUM WASHED KRAFT PULP AND OF REPULPED CORRUGATED CONTAINER EFFLUENT CHARACTERISTICS,
National Council of the Paper Industry for Air and Stream Improvement, Inc., New York.

For primary bibliographic entry see Field 5B.
W75-07634

DEWATERING OF SEWAGE SLUDGE (ENTWAESSERUNG VON KLAERSCHLAMM),
Lurgi Apparate-Technik G.m.b.H., Frankfurt am Main (West Germany).
G. Thomas.
English translations of Chemie-Ingenieur-Technik, Vol 46, No 11, p 471-476, 1974. 11 fig, 18 ref.

Descriptors: *Sewage sludge, *Sludge treatment, *Dewatering, *Reviews, Filtration, Centrifugation, Aluminum, Equipment, Sludge, Heat treatment, Chemicals, Lime, Iron compounds, Salts, Polyelectrolytes, Water purification, Water quality control, Incineration, Water pollution treatment, Filters, *Waste treatment.
Identifiers: Aluminum compounds.

This is a review of the status of sludge dewatering techniques, including thickening, vacuum and pressure filtration, and centrifugation. Also covered are the recovery of aluminum compounds and a comparison of dewatering devices. The need for conditioning of sludges through thermal treatment or addition of chemicals (lime, iron salts, aluminum salts, polyelectrolytes, ash) to attain good filtration and centrifugation properties shows how important it is not to view dewatering as a closed process, but rather as part of effluent and sludge treatment, including incineration. (Speckhard-IPC)
W75-07635

STUDIES ON COAGULATION TREATMENT OF SPENT WATER FROM PULPING PROCESS. (I). COAGULATION CHARACTERISTICS OF LIGNOSULFONATE (IN JAPANESE),
Tokyo Univ. (Japan).
M. Jo, G. Meshitsuka, and J. Nakano.
Japan Tappi, Vol 28, No 12, p 604-610, December 1974. 9 fig, 1 tab, 12 ref. English summary.

Descriptors: *Coagulation, *Bleaching wastes, *Pulp wastes, Pulp and paper industry, *Lignins, *Waste water treatment, Chlorination, Chlorine, Separation techniques, Water pollution sources, Chemical reactions, Chemical precipitation, Aluminum, Sulfates, Hydrogen ion concentration, Waste water treatment, Sulfonates, Foreign research.
Identifiers: *Japan.

The coagulation of lignin residues in pulp mill bleach plant effluents was studied, using a commercial lignosulfonate as a lignin model compound, which was purified by gel chromatography and treated with chlorine (alone or plus NaOH) under conditions simulating pulp bleaching. Chlorination markedly increased the number of functional groups (COOH, phenolic OH and CO) and decreased the molecular weight of the lignosulfonate. The presence of NaOH did not alter this result significantly, except to produce a larger number of phenolic OH groups. Aluminum sulfate at pH 4.5-5.0 effectively coagulated untreated, Cl-treated, and Cl/NaOH-treated lignosulfonate, but the efficiency of coagulation dropped markedly with increased amount of added Cl. The efficiency was better when coagulant was added before, rather than after, pH adjustment of the effluent. (Brown-IPC)
W75-07636

MEMBRANE PROCESSES FOR FRACTIONATION AND CONCENTRATION OF SPENT SULFITE LIQUORS,
Institute of Paper Chemistry, Appleton, Wis.
I. K. Bansal, and A. J. Wiley.
Tappi, Vol 58, No 1, p 125-130, January 1975. 3 fig, 6 tab, 11 ref.

Descriptors: *Sulfite liquors, *Pulp wastes, *Reverse osmosis, *Waste water treatment, Water pollution sources, Industrial wastes, Pulp and paper industry, Water pollution treatment, Membrane processes, Separation techniques, Organic compounds, Lignins, Sulfonates, Wastes, Waste treatment, Costs, Membranes, Filtration, Pressure, Temperature, Energy, Liquid wastes, Carbohydrates, Evaporation.
Identifiers: *Ultrafiltration, Cellulose acetate, Sugars, Reducing sugars, Wood sugars, Fractionation, Concentration, Calcium-base liquors.

Commercially available ultrafiltration and reverse osmosis modules equipped with cellulose acetate membranes were effectively employed to fractionate and concentrate marketable wood chemicals from spent sulfite liquors. Fractionation of calcium-base spent sulfite liquors was conducted in the ultrafiltration modules operated at 300 psig and elevated temperatures. The feed with 28% reducing sugar on solids was converted to permeates with 62% sugar on solids. Spent sulfite liquors were concentrated from 103 to 309 g/liter of solids with an overall average flux rate of 20.7 gal/sq ft/day. Concentration of the lower molecular weight organics (mainly reducing sugars) contained in the ultrafiltration permeates were carried to 206 g/liter of total solids, with use of reverse osmosis 'tight' membranes operated at 30-35 C and 700 psig. Recovery of wood sugars in the final concentrate averaged 87%, with an overall average flux rate of about 5.5 gal/sq ft/day. Under some conditions, it may be possible to directly utilize or market the ultrafiltration concentrate of the high molecular weight lignosulfonates at the 30% solids concentration and also the reverse osmosis concentrate containing reducing sugars at the 20% total solids level. A modified flow sheet is proposed for combining the membrane systems with evaporation units. Tables indicating projected cost savings and thermal energy savings obtained with such a combination are included. (Sykes-IPC)
W75-07638

PROSPECTS FOR THE APPLICATION OF REVERSE OSMOSIS IN THE PULP AND PAPER INDUSTRY (PERSPEKTIVY PUZITIA REVERZNEJ OSMOZY V CELULOZOPAPIERENSKOM PRIEMYSLE),
Vyskumny Ustav Papieru a Celulozy, Bratislava (Czechoslovakia).
L. Balhar.
Papir a Celuloza, Vol 29, No 11, p 257-259, 1974. 5 fig, 3 ref.

Descriptors: *Reverse osmosis, *Pulp wastes, *Bleaching wastes, *Waste water treatment, Separation techniques, Sulfite liquors, Industrial wastes, Water pollution sources, Osmotic pressure, Membrane processes, Pressure, Water quality control, Water pollution treatment, Membranes, Wastes, Waste treatment, Filtration, Strength, Liquid wastes, Laboratory tests, Foreign countries, Pulp and paper industry.
Identifiers: Czechoslovakia.

Reverse osmosis has shown promise in treating pulp and paper mill effluent. The reverse osmosis rate depends on the quality of the membrane and on the difference between the osmotic pressure of the thickened solution and the reverse osmosis pressure used. Laboratory data are given showing the osmotic pressure of spent pulping liquor solutions and bleachery effluents of various concentration. The data show that the osmotic pressure of bleachery effluents increases with increasing concentration more steeply than that of effluents containing spent liquors and consequently that reverse osmosis pressures of 40 and 84 kg/sq cm would be needed to concentrate effluents containing spent liquor and bleachery effluent, respectively, considering that the reverse osmosis pressure has to be about 30 kg/sq cm higher than the osmotic pressure of the concentrated liquid to achieve an acceptably high rate. Since the use of high pressure is limited by membrane strength, the possibility of concentrating the bleachery effluent to only 25 g/liter and the use of more permeable membranes retaining only organic molecules are discussed. (Trubacek-IPC)
W75-07639

SPECIFIC WASTEWATER DISCHARGE AND SPECIFIC POLLUTION LOAD OF PAPER MILLS (UEBER DEN SPEZIFISCHEN ABWASSERANFALL UND DIE SPEZIFISCHE SCHMUTZFRACHT VON PAPIERFABRIKEN),
Technische Universitaet, Darmstadt (West Germany). Wasser- und Abwasserforschungsstelle.
For primary bibliographic entry see Field 5B.
W75-07640

GULF STATES (PAPER CORPORATIONS'S TUSCALOOSA, ALABAMA) NEW MULTI-HEARTH FURNACE WASTE TREATMENT SYSTEM,
Gulf States Paper Corp., Tuscaloosa, Ala.
R. R. Fuller.
Southern Pulp and Paper Manufacturer, Vol 37, No 12, p 22-25, December 1974. 4 fig, 2 tab.

Descriptors: *Pulp wastes, *Waste water treatment, *Tertiary treatment, *Incineration, Water purification, Pulp and paper industry, Organic compounds, Dewatering, Suspended solids, Oxygen demand, Color, Water pollution sources, Waste treatment, Industrial wastes, Effluents, Industrial plants, Treatment facilities, Oxygen, Oxidation, Biological treatment, Chemical precipitation, Coagulation, Aluminum, Sulfates.
Identifiers: Nichols-Herreshoff furnace, Aluminum sulfate, Chemical recovery.

The tertiary treatment system described includes a four-stage bio-oxidation system and an Eimco reactor-clarifier where alum mud is added to react with residual organic compounds. Insoluble materials are thickened and then dewatered. Dewatered solids are conveyed to a Nichols-Herreshoff multiple-hearth furnace where they are burned to an ash which is treated with sulfuric acid to recover alum mud for reuse. Effluent treatment system equipment vendors are listed. (Sykes-IPC)
W75-07641

JET AERATION IN DEEP CHANNEL CIRCLING CLARIFIER IS WORKING WELL FOR K-C MILL,
Kimtech, Inc., Neenah, Wis.
A. R. LeCompte.
Paper Trade Journal, Vol 159, No 1, p 1 (cover), 28-32, January 6, 1972. 8 fig, 9 ref.

Descriptors: *Pulp and paper industry, *Waste water treatment, *Aeration, *Treatment facilities, Industrial wastes, Water purification, Water pollution treatment, Channel flow, Channels, Jets, Sulfite liquors, Clays, Water pollution sources, Oxygenation, Water quality control, Air, Air entrainment, Pulp wastes, Pollution abatement, Pumps, *Massachusetts.
Identifiers: Starch, Clarifiers, Hemp, Paper mills, Kraft mills, NSSC pulp mills.

A jet aeration system was installed at Kimberly-Clark (K-C), Corporation's Lee, Massachusetts mill to treat pulp mill wastes from kraft and neutral sulfite cooks of hemp, and paper mill waste consisting of significant amounts of clay and starch (used in the production of coated business papers). The aeration equipment consists of seven 8-jet manifolds, each served by a submersible pump. Air is provided by two centrifugal blowers, and a ring manifold distributes the air around the channel. The jet manifold system is housed in a circular channel concentric with the final clarifier. In the aeration process, a primary fluid is directed through a nozzle into a mixing chamber. Air enters the chamber and is sheared into minute bubbles when entrained in the primary fluid. The combined mixture is jetted into the aeration channel, which

forms a plume that travels horizontally while spreading through the flow before rising to the surface. Capacities of the system are outlined. (Sykes-IPC)
W75-07642

ENVIRONMENTAL PROTECTION AND ECONOMIC ASPECTS OF INTERNAL WATER CIRCULATION SYSTEMS IN THE PULP AND PAPER INDUSTRY (UMWELTFREUNDLICHE UND WIRTSCHAFTLICHE ASPEKTE INNERER WASSERKREISLAUEFE IN DER PAPIER- UND ZELLSTOFF-INDUSTRIE),
W. Lutz.
Das Oesterreichische Papier, Vol 11, No 9, p 19-22, September 1974. 2 fig.

Descriptors: *Pulp wastes, *Pulp and paper industry, *Water reuse, *Costs, *Water conservation, Waste water treatment, *Pollution abatement, Water consumption(Except consumptive use), Economics, Effluents, Industrial wastes, Reclaimed water, Water purification, Recirculated water, Treatment facilities.
Identifiers: *Attisholz process, Ruthner clarifier.

Recirculated water is increasingly used to reduce water consumption in the paper industry, and some of its aspects are discussed. A diagram is given of the Attisholz process for the water treatment system of sulfite pulp mills, and a sketch is included of the Ruthner rapid clarifier for purifying effluent. Some statistics on the costs of different purification processes for the effluents of various types of paper mills are presented. (Ward-IPC)
W75-07643

MERCURY CLEANUP ROUTES--I,
M. D. Rosenzweig.
Chemical Engineering, Vol 82, No 2, p 60-61, January 20, 1975. 2 fig.

Descriptors: *Mercury, *Waste water treatment, *Pollution abatement, Activated carbon, Ion exchange, Water pollution sources, Industrial wastes, Chemical wastes, Metals, Water pollution control, Waste treatment, Foreign research, Separation techniques.
Identifiers: Chlor-alkali plants, *Akzo TMR process, *BMS process, *TNO process.

Brief descriptions are given of processes developed by Billingsfors Bruks AB. (Sweden), the Organization for Applied Scientific Research (TNO) in the Netherlands, and Akzo Zout Chemie Nederland B.V. (Netherlands), for removing mercury from waste waters, particularly waste waters from chlor-alkali plants. Both the Billingsfors Bruks BMS process and the TNO process use specially activated carbons to absorb mercury, while the Akzo process uses a resin in which thiol groups are attached to a chemically inert and mechanically strong matrix (a macroporous styrene/divinylbenzene copolymer). Flow diagrams of the Billingsfors BMS and the Akzo Imac TMR processes are included. (See also W75-07647) (Witt-IPC)
W75-07646

MERCURY CLEANUP ROUTES -- II,
N. R. Iammartino.
Chemical Engineering, Vol 82, No 3, p 36-37, February 3, 1975. 2 fig, 1 tab.

Descriptors: *Mercury, *Waste water treatment, *Pollution abatement, Water pollution sources, Industrial wastes, Chemical wastes, Metals, Waste treatment, Wastes, *Separation techniques, Water pollution control, Iron, Oxidation, Chemical precipitation.
Identifiers: *Re-elixirization process, Japan, Magnetic ferrites.

Brief descriptions are given of three commercial techniques, developed by Nippon Electric Co. (Tokyo, Japan), Georgia-Pacific Corp. (Bellingham, Washington), and FMC Corp. (New York), for removing mercury from waste waters. Nippon's batch orcontinuous process purges mercury and other heavy metals from various effluents such as offgas-scrubbing liquor from municipal waste incineration, and waste water from electroplating of metals. The other two processes remove mercury from chlor-alkali plant wastes. (See also W75-07646) (Witt-IPC)
W75-07647

BIODEGRADATION BY THE ACTIVATED SLUDGE SYSTEM OF STEAM PROCESS WATER IN THE TIMBER INDUSTRY,
M. Reinbold, and M. Mallevialle.
Water Research, Vol 9, No 1, p 87-93, January 1975. 7 fig, 7 tab, 7 ref.

Descriptors: *Waste water treatment, *Activated sludge, *Biodegradation, *Wood wastes, Steam, Organic matter, Biochemical oxygen demand, Chemical oxygen demand, Water pollution sources, Laboratory tests, Nitrogen, Phosphorus, Nutrients, Color, Phenols, Bacteria, Drying, *Industrial wastes, Waste treatment, Pollution abatement, Pine trees, Carbohydrates, Organic loading, Biological treatment, Drying, Economics.
Identifiers: *Plywood industry, *Veneer industry, Total organic carbon, Polysaccharides, Tannins, Humus, Pentosans, Sugars, Corynebacterium.

Waste water resulting from the steam drying of pinewood peeler logs contains a large amount of organic matter. Treatments by coagulation or flocculation are inadequate for removing this material, and incineration is too expensive. Laboratory studies are described which show that this material can be removed by the activated sludge process. If sufficient N and P nutrient elements are added, a high level of efficiency is achieved: 98% of the 5-day BOD, 70% of the COD, and 66% of the total organic carbon are removed. Most of the remaining nonbiodegradable products, which are responsible for the color of the water, are polysaccharide compounds. During treatment, the tannins, pseudo-humic matter, phenols, polyphenols, and certain pentosans and simple sugars disappear completely. Biological purification is effected predominantly through the action of bacteria of the genus Corynebacterium. (Witt-IPC)
W75-07649

THE AKZO PROCESS FOR THE REMOVAL OF MERCURY FROM WASTE WATER,
Akzo Zout Chemie Nederland B.V., Hengelo (Netherlands).
G. J. De Jong, and C. J. N. Rekers.
Journal of Chromatography, Vol 102, p 443-450, December 31, 1974. 5 fig, 1 tab.

Descriptors: *Mercury, *Waste water treatment, *Ion exchange, *Pollution abatement, Oxidation, Hydrogen ion concentration, Filtration, Chlorine, Sodium compounds, Iron compounds, Activated carbon, Bonding, Water pollution sources, Industrial wastes, Metals, Water pollution control, Waste treatment, Foreign research, Resins, Separation techniques, Wastes, Chemical wastes.
Identifiers: *Akzo process, Chlorine compounds, Sodium hypochlorite, Imac TMR ion exchange resin, Chlor-alkali plants.

A Dutch process for the removal of mercury from waste water, particularly from chlor-alkali plants, consists of (1) oxidation of the metallic mercury to ionic mercury with chlorine or sodium hypochlorite, (2) control of the waste water pH at about 3 to keep iron in solution, (3) filtration in a sand or cloth filter to remove solids, (4) dechlorination of the liquid with activated carbon, and (5) removal of the mercury on the Imac TMR ion-exchange resin. The latter is a polymeric mercaptan in which thiol groups are attached to a chemically and mechanically inert matrix. The affinity of this thiol resin towards mercury is very high; the strength of the resin-mercury bond is comparable to that of the mercury-sulfur bond in HgS. The resin can be regenerated with concentrated HCl. The process guarantees a low concentration of mercury (less than 5 ppb) in the effluent even under strongly fluctuating conditions. The mercury is recycled into the electrolysis process. The Akzo process is competitive with other processes for the removal of mercury from waste water. (Witt-IPC)
W75-07658

CONSIDERATIONS FOR ANALYSIS OF INFILTRATION-INFLOW,
National Environmental Research Center, Cincinnati, Ohio. Advanced Waste Treatment Research Lab.
D. J. Cesareo, and R. Field.
September 16, 1974. 27 p, 2 tab, 1 fig, 11 ref.

Descriptors: *Inflow, *Infiltration, *Sewerage, *Waste water disposal, *Water pollution control, *Combined sewers, Sewers, Leakage, Maintenance, Operation and maintenance, Municipal wastes, Water pollution control, Overflow, Engineering design, Sanitary engineering, Environmental engineering.

The impacts of raw wastewater diversion at treatment facilities, the incidence and duration of sewage overflows, and adverse sanitary and health conditions and inconveniences caused by surcharged sewers and flooding constitute serious problems in many urban areas. This necessitates careful operation of waste water collection and treatment facilities and reduction of infiltration and inflow to public and private sewer systems. Infiltration and inflow countermeasures can be divided into two parts; prevention of excessive extraneous flows, and correction of conditions already imposed on existing sewer systems. Prevention of excessive infiltration into new sewer systems depends on effective design; choice of materials; rigid limitations on infiltration allowances; and diligent inspection and testing of construction projects. Correction of excessive infiltration in existing sewer systems involves evaluation and interpretation of sewage flow conditions to determine the presence and extent of the problem, the location and gauging of such infiltration flows, a cost-effective engineering evaluation to optimize corrective methods, and the elimination of these flows by various repair and replacement methods. (Poertner)
W75-07664

CONTROL OF FILAMENTOUS MICROORGANISMS DURING ACTIVATED SLUDGE TREATMENT OF A COMPLEX INDUSTRIAL WASTE,
Virginia Polytechnic Inst. and State Univ., Blacksburg.
C. W. Randall, P. H. King, and R. C. Hoehn.
Paper presented at the WWEMA Industrial Water and Pollution Control Conference and Exposition, Conrad Hilton Hotel, Chicago, Illinois, March 14-16, 1973. 27 p, 11 fig, 3 tab, 5 ref.

Descriptors: *Activated sludge, *Sludge treatment, *Waste water treatment, *Microorganisms, *Oil wastes, Industrial wastes, Effluent, Treatment facilities.
Identifiers: Activated Sludge treatment, Filamentous microorganisms, Filamentous overgrowth, Nylon.

Although highly treatable, waste finishing oil from a nylon manufacturing process, when added to wastewater flow from biological treatment, has some unusual properties that cause the activated sludge system to repeatedly become filamentous. Activated sludge treatment of the wastewater without finishing oils did not produce filaments. Sludge bulk due to overgrowth of the filamentous

forms caused systems failure. Investigation revealed that sludge bulking was stimulated by three different conditions. A small deficiency of nitrogen stimulated proliferation and was prevented by adding both nitrogen and phosphorus to the waste prior to treatment. A mixed liquor pH below 6 produced bulking and subsequent wide fluctuation in pH values. Although pH adjustments were made, the sludge still bulked when the dissolved oxygen concentration dropped below 1 mg/l. Bulking was caused by the activated sludge flocs becoming brush-shaped due to low oxygen tension. Improvment in the settling properties occurred when the dissolved oxygen concentration was raised above 1 mg/l. Also, the 'food-to-microorganisms' ratio affected the settling properties. BOD5 values above .9 should not be used. Once these factors were controlled the substrate removal rate was greater than typical domestic sewage values, oxygen requirements were moderate, and sludge production was low. (Poertner)
W75-07666

LINCOLN TRAIL AREA DEVELOPMENT DISTRICT COMPREHENSIVE WATER AND SEWER PLAN.
Schimpeler-Corradino Associates, Louisville, Ky.
Lincoln Trail Area Development District, Elizabethtown, Kentucky, June 1973. 538 p, 43 tab, 26 fig, 7 append.

Descriptors: *Planning, *Land use, *Sewerage, *Water supply development, *Urbanization, *Kentucky, Long-term planning, Comprehensive planning, Water resources development, Regional development, Regional analysis, Cities, Water quality control.
Identifiers: *Lincoln Trail Area Development District.

The planning philosophy of Lincoln TRAIL Area Development is based on an understanding that land use patterns are shaped by the availability of water and sewer utilities. The importance of utilities to an industry and/or commercial location must be considered in developing an effective program, as well as the realization that there exists a minimum population density upon which water and/or sewer facilities can be established. Detailed analyses of existing facilities, administrative jurisdictions, water resources, capabilities and quality, and fiscal resources constitute elements for this planning process. There are nine objectives to be fulfilled to make a water/sewer plan effective: (1) provide a realistic projection of socio-economic factors; (2) relate land use planning to water and sewer development; (3) provide orderly development of all water and sewer systems; (4) establish optimum service areas; (5) make best use of public money; (6) provide a definitive guide, for regional review, for water and sewer; (7) establish a system of priorities for water and sewer facilities; (8) provide annual estimates of funds from federal agencies; and (9) provide estimated total annual capital requirements for each area development district. The allocation of scare resources toward the development of water and sewer systems is a fundamental part of the planning for utilities. (Poertner)
W75-07667

GREATER TAMPA UTILITY GROUP-STANDARD UTILITIES LOCATION,
Greater Tampa Utility Group, Fla.
For primary bibliographic entry see Field 8A.
W75-07668

SECONDARY TREATMENT AND BEST PRACTICABLE TECHNOLOGY,
Kalamazoo Dept. of Public Works, Mich.
D. H. Swets.
Paper presented at APWA International Congress and Equipment Show, Denver, Colorado, September 18, 1973. 6 p.

Descriptors: *Federal Water Pollution Control Act, *Tertiary treatment, *Waste water treatment, *Sewage treatment, Sludge, Domestic waste, Effluents, Water pollution control, Treatment facilities, Water quality control, Water Quality Act, Water quality standards, Waste water disposal, Waste water(Pollution), Sanitary engineering.
Identifiers: *Secondary treatment, *Effluent quality, *Best practicable technology, Combined sewers, Wastewater effluent.

Enforcing the Federal Water Pollution Control Act Amendments of 1972 is directly linked to the true meaning of the terms 'secondary treatment' and 'best practicable technology'. Although defined as 'treatment of wastewater by biological methods after primary treatment by sedimentation', secondary treatment as practiced today can achieve a wide variety of degrees in removal of pollutants depending on the extent, efficiency, and effectiveness of the facilities provided. Using suspended values of 15 mg/l of BOD5 and 20 mg/l suspended solids, most plants already constructed would not be adequate. Plants using the trickling filter and activated sludge process can be expected to produce, consistently, only 70% to 90% removal instead of the proposed 92% removal. Regulations now state an intent to achieve 85% removal. Secondary treatment plants may be upgraded by construction of additional aeration or trickling filtering capacity and final settling facilities. Effluent standards applicable to wastewater treatment using best practicable technology will become more restrictive. It appears that the ultimate oxygen demand (considering the ultimate BOD, ammonia nitrogen concentration and dissolved oxygen in the effluent) will be a factor, as will the chemical oxygen demand. More testing and analysis of wastewater effluent components will be necessary. (Poertner)
W75-07669

A BIOLOGICAL ABSORPTION SYSTEM FOR THE TREATMENT OF COMBINED SEWER OVERFLOW,
Envirex, Inc., Milwaukee, Wis. Environmental Sciences Div.
R. W. Agnew, C. A. Hansen, O. F. Nelson, W. H. Richardson, and L. Holt.
Paper presented at 1974 International Public Works Congress and Equipment Show, Toronto, Ontario, Canada, September 16, 1974. 40 p, 12 fig, 8 tab.

Descriptors: *Biological treatment, *Sewage treatment, *Combined sewers, *Overflow, Lake Michigan, Water quality control, Water pollution control, Sludge, Storm runoff, Water pollution, Waste water treatment, Wisconsin.
Identifiers: *Sewer overflow, Kenosha(Wisconsin), Contact stabilization, Biological absorption.

The Kenosha Demonstration project has demonstrated the engineering feasibility of utilizing a high rate biological absorption process to treat combined sewer overflow. Essentially a high rate contact stabilization process, the project consisted of the construction, operation, and evaluation of a 20 MGD treatment system added to an existing 23 MGD conventional activated sludge plant. During 46 overflow events, 164.52 million gallons of potential combined sewer overflow were treated. Results indicate an average removal of 93% in suspended solids, 83% total BOD5, and 68% of dissolved BOD5. On the basis of weighted mean concentrations, raw and final, of measured parameters it was determined that the systems concept was sound and that effluent quality was approximately equivalent to conventional secondary treatment. Stabilization time was shown to adversely affect effluent quality. In all cases, the time of storage in biosolid reservoirs should be limited to five days or less. In the new treatment systems built in future years, it is recommended that the mixed liquor suspended solids range between 1700-5000 mg/l, contact time and between 10-20 minutes, reaeration time between 1-3 hours, and one-third of the dissolved oxygen supply be allocated to the contact basin and two-thirds to the stabilization process. (Poertner)
W75-07678

POLYMER AIDED ALUM COAGULATION OF TEXTILE DYEING AND FINISHING WASTES,
Virginia Polytechnic Inst. and State Univ., Blacksburg.
W. C. Kreye, P. H. King, and C. W. Randall.
Paper presented at 27th Annual Industrial Wastes Conference, Purdue University, West Lafayette, Indiana, May, 1972. 22 p, 10 fig, 2 tab, 7 ref.

Descriptors: *Textiles, *Waste water treatment, *Polymers, *Coagulation, *Dyes, Flocculation, Aluminum, Water quality control, Industrial wastes, Color, Virginia, Sludge, Water pollution control.
Identifiers: *Alum, Textile dyeing waste, Polyelectrolytes, United Piece Dye Works, Bluefield(Virginia).

A chemical treatment system utilizing (either) alum (alone or in combination) with a properly selected polyelectrolyte is highly efficient in removing a high percentage of color from a representative textile dyeing and finishing waste, as well as being effective in removing a substantial fraction of organic matter. Polymer usage decreases the alum demand to below 270 ppm. Flocculation time decreases to two to three minutes and settling time to five to ten minutes depending upon the polymer used. Sludge volume was in the two percent range for all systems. Removal of color and organic matter was largely independent of the polymer used. Polymer conditioning alleviates the problems associated with a voluminous, poorly settling floc and results in an overall process that may well find increasing application in the context of increasingly rigid water quality standards. (Poertner)
W75-07682

PLASTIC PIPE IN COLDER CLIMATES,
Winnipeg Waterworks, Waste and Disposal Div. (Manitoba).
For primary bibliographic entry see Field 5F.
W75-07683

CHEMICAL CONTROL OF ROOTS,
Sacramento County Dept. of Public Works, Calif.
N. R. Townley.
Septermber 1973. 19 p, 3 fig, 1 tab, 2 ref.

Descriptors: *Root systems, *Sewerage, *Clogging, *Chemcontrol, *Root development, *Sewers, Pipelines, Herbicides, California, Maintenance, Public utilities, Operation and maintenance, Pipes, Waste water disposal.
Identifiers: *Roots, *Root kills, Metham, Dichlobenil, Endothal, Sacramento(California).

Removal of root growth from sewer collection systems constitutes a significant portion of the sewer maintenance budget. Although effective when used at scheduled intervals, mechanical cleaning does not inhibit root regrowth. Chemicals, when properly used, will kill the roots and discourage their return. From preliminary laboratory tests, the chemicals Metham, Dichlobenil, and Endothal emerged as candidates for field testing. From 1969 to 1972, about 447,000 feet of 6 in. diameter vitrified clay pipe were treated at a current cost figure of 16 cents per foot. Down-stream manholes were blocked with inflatable plugs and one gallon of chemical for each one hundred gallons of water was dumped into an upstream manhole. After two years, post-television inspection of treated lines indicated positive results. Tabulations from the years 1966 to 1972 give data on the steady decline in root stoppages, mainly since 1969, Metham proved to be an effective root killer, capable of killing beyond the point of actual treat-

ment. Dichlobenil also kills roots and acts as an inhibitor for regrowth. To achieve the average root kill of 75%, careful consideration must be given to application procedures. (Poertner)
W75-07685

LIMESTONE AND LIMESTONE-LIME NEUTRALIZATION OF ACID MINE DRAINAGE,
Environmental Protection Agency, Rivesville, W. Va. Crown Mine Drainage Control Field Site.
R. C. Wilmoth.
For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402 Price $1.40. Environmental Protection Agency, Cincinnati, Ohio, Report EPA-670/2-74-051, June 1974. 91 p, 15 fig, 47 tab, 32 ref.

Descriptors: *Limestone, *Mine drainage, Iron, *Calcium hydroxide, Excavation, *Neutralization, *Waste water treatment, Sludge, Cost comparisons, Water pollution control, Surface drainage, *West Virginia.
Identifiers: *Coal mine drainage, *Ferric iron.

The critical parameters affecting neutralization of ferric-iron acid mine waters were characterized in comparative studies using hydrated lime, rock-dust limestone, and a combination of the two as neutralizing agents. The advantages and disadvantages of each of these neutralizing agents were noted. On the ferric-iron test water, combination limestone-lime treatment provided a better than 25-percent reduction in materials cost as compared to straight lime or limestone treatment. Significant reduction in sludge production was noted by the use of rock-dust limestone and by the use of combination treatment as compared to hydrated-lime treatment. Emphasis on optimizing limestone utilization efficiencies resulted in an increase from approximately 35- to 50-percent utilization. Studies using limestone that had been ground to pass a 400-mesh screen resulted in utilization efficiencies near 90 percent. (EPA)
W75-07688

MINE DRAINAGE POLLUTION CONTROL DEMONSTRATION GRANT PROCEDURES AND REQUIREMENTS,
NUS Corp., Rockville, Md.
For primary bibliographic entry see Field 5G.
W75-07690

URBAN STORMWATER MANAGEMENT AND TECHNOLOGY: AN ASSESSMENT,
Metcalf and Eddy, Inc., Palo Alto, Calif.
J. A. Lager, and W. G. Smith.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-231 345, $3.25 in paper copy, $2.25 in microfiche. Environmental Protection Agency, Cincinnati, Ohio. Report EPA-670/2-74-040, December 1974. 447 p, 83 fig, 85 tab, 308 ref. 1BB034/ROAP 21ASZ/Task 1 EPA Contract 68-03-0179.

Descriptors: Disinfection, Drainage, Water pollution, *Waste water treatment, *Sewage treatment, Surface runoff, Runoff, Sewage, Water quality, Cost analysis, Storage tanks, *Storm sewers, *Overflow, *Combined sewers, Hydraulics, *Mathematical models, Remote control, *Urban runoff, *Storm water.
Identifiers: Physical-chemical treatment.

A comprehensive investigation and assessment of promising, completed, and ongoing urban stormwater projects, representative of the state-of-the-art in abatement theory and technology, has been accomplished. The results, presented in textbook format, provide a compendium of project information on management and technology alternatives within a framework of problem identification, evaluation procedures, and program assessment and selection. Essentially every metropolitan area of the United States has a stormwater problem, whether served by a combined sewer system (approximately 29 percent of the total sewered population) or a separate sewer system. However, the tools for reducing stormwater pollution, in the form of demonstrated processes and devices, do exist and provide many-faceted approach techniques to individual situations. These tools are constantly being increased in number and improved upon as a part of a continuing nationwide research and development effort. The most promising approaches to date involve the integrated use of control and treatment systems with an areawide, multidisciplinary perspective. (EPA)
W75-07692

EVALUATION OF ALTERNATIVE METHODS FOR FINANCING MUNICIPAL WASTE TREATMENT WORKS,
Meta Systems, Inc., Cambridge, Mass.
R. J. deLucia, L. M. Koppel, D. F. Luecke, S. Robinson, and P. Schaefer.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-241 045, $7.25 in paper copy, $2.25 in microfiche. Environmental Protection Agency, Report EPA-600/5-75-001, March 1975. 190 p, 11 fig, 371 tab, 52 ref, 6 append. EPA Contract 68-01-2411.

Descriptors: *Waste water treatment, *Treatment facilities, *Financing, Costs, Evaluation, *Alternative costs, Projects, Programs.

This is part of a continuing investigation by the EPA of alternative financing programs for treatment plant facilities undertaken in response to Section 317 of The Water Pollution Control Act Amendments of 1972. Findings and recommendations regarding alternative financing programs are presented. Current programs are reviewed, criteria for the evaluation of financing programs are described and some differences of current programs in light of these criteria are discussed. Important features of alternative financing programs are discussed and an analysis of features that could be changed to improve program preference according to the criteria is presented. (EPA)
W75-07693

SYSTEM ALTERNATIVES IN OXYGEN ACTIVATED SLUDGE,
District of Columbia Dept. of Environmental Services, Washington.
J. B. Stamberg, D. F. Bishop, S. M. Bennett, and A. B. Hais.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-241 310, $4.25 in paper copy, $2.25 in microfiche. Environmental Protection Agency, Cincinnati, Ohio. Report EPA-670/2-75-008, April 1975. 59 p, 22 fig, 6 tab, 26 ref. 1BB043 ROAP 21-ASR Task-015 68-01-0162.

Descriptors: Oxygen, Sedimentation, *Waste water treatment, *Activated sludge, Centrifuges, Dewatering, Filtration, Suspended solids, *Settling basins, Alternative planning, Aerobic bacteria.
Identifiers: *Oxygen activated sludge.

An oxygen activated sludge system with co-current contacting of oxygen and mixed liquor in a plug flow reactor was operated on District of Columbia primary effluent during a two-year period over a wide range of loading (F/M 0.26 to 2.0) with Solids Retention Times (SRT) from 2.0 to 13.0 days at the EPA-DC Pilot Plant. The reactor detention times varied from a nominal 1.5 to over 3.0 hours with the mixed liquor suspended solids between 2700 and 8100 mg/l. The clarifier overflow rates varied between 300 and 1960 gpd/ft2 depending on the mixed liquor particle shape (the intensity of filamentous growth) and water temperature. The average underflow solids varied between 1.0% and 2.4% depending on clarifier volume and recycle rate. The total solids production varied from 0.35 to 1.0 pound of solids produced per pound of BOD5. The undigested underflow solids thickened to 4-5% by either gravity or air floatation without chemical additives and dewatered by vacuum filtration to 8-12% with polymers and 13-21% with lime and ferric chloride addition. (EPA)
W75-07695

PILOT SCALE TREATMENT OF WINE STILLAGE,
California State Dept. of Agriculture, San Francisco. Wine Advisory Board.
E. D. Schroeder.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 996, $5.75 in paper copy, $2.25 in microfiche. Environmental Protection Agency, Corvallis, Oregon. Report EPA-660/2-75-002, February 1975. 118 p, 25 fig, 42 tab, 22 ref. 1BB037. 12060 HPC.

Descriptors: *Centrifugation, *Industrial wastes, *Waste identification, *Biological treatment, Separation techniques, *Waste water treatment, Farm wastes, Pilot plants, *Aerobic treatment, Lagoons.
Identifiers: *Winery waste water, Anaerobic packed towers.

Pilot and laboratory scale studies were run on aerobic and anaerobic biological treatment of winery stillage over a two year period. The pilot scale studies included work with aerobic lagoons and anaerobic packed towers. Laboratory systems studied were aerobic reactors without recycle and batch fed anaerobic processes. Because suspended solids removal was a key factor in successful biological treatment, centrifugation, detartration, coagulation and flocculation, and combinations of these methods were included in the studies. Centrifugation was the best method of removing solids prior to biological treatment. Solids removal in combination with an aerobic treatment process can be expected to produce final filtrate chemical oxygen demands of about 700 mg/l and a final filtrate BOD of about 75 mg/L. Anaerobic processes studied did not operate well but produced effluents with chemical oxygen demands of the order of 4000 mg/L. (EPA)
W75-07699

THE EFFECTS OF AIR AND WATER POLLUTION CONTROLS ON SOLID WASTE GENERATION, 1971-1985, EXECUTIVE SUMMARY,
Stone (Ralph) and Co., Inc., Los Angeles, Calif.
For primary bibliographic entry see Field 5B.
W75-07705

FEASIBILITY OF 5 GPM DYNACTOR/MAGNETIC SEPARATOR SYSTEM TO TREAT SPILLED HAZARDOUS MATERIALS,
Industrial Bio-Test Labs., Inc., Northbrook, Ill.
R. G. Sanders, S. R. Rich, and T. G. Pantazelos.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-241 080, $3.75 in paper copy, $2.25 in microfiche. Environmental Protection Agency, Cincinnati, Ohio, Report EPA-670/2-75-004, April 1975. 32 p, 11 fig, 4 tab, 3 ref. 68-01-0123.

Descriptors: Design, Operations, *Water treatment, *Activated carbon, Water pollution treatment, *Separation techniques, Neutralization, Chemical precipitation, *Waste water treatment.
Identifiers: Hazardous materials spill control, Hazardous chemical spills, Dynamic reactors, *Magnetic separators.

Design and operating details are given for a new type of continuous flow thin-film, gas-liquid-particulate contact device called the Dynactor. The device is used as a continuous flow short-time contact reactor to effectively decontaminate water contaminated with spilled hazardous materials. The decontamination is effectively achieved by one or more processes involving oxidation,

neutralization, precipitation or adsorption on powdered carbon. Contaminated water is processed by the pilot plant model Dynactor at 100 psi and at a rate of .5 gpm; stoichiometric quantities of decontaminating agents in the form of gases, liquids, slurries or powders are metered into the continuously flowing liquid configuration. The device is portable, lightweight polypropylene construction, has no moving parts, requires a pump for liquid motive power and can be scaled up to process 250 gpm of contaminated water. Design and operating details are given for continuous flow magnetic separation to remove flocculated carbon and precipitates from the Dynactor effluent after decontamination of hazardous materials. Experimental data on successful decontamination of heavy metals by precipitation, acids and bases by neutralization, phenol, chlorine and pesticides by powdered carbon adsorption and other selected hazardous compounds are presented. (EPA)
W75-07706

PROCESS DESIGN MANUAL FOR SUSPENDED SOLIDS REMOVAL.
Hazen and Sawyer, New York.
Environmental Protection Agency, Technology Transfer Office, Washington, D.C., January 1975. 263 p, 81 fig, 36 tab, 249 ref.

Descriptors: *Suspended solids, *Waste water treatment, *Sedimentation, *Filtration, *Flocculation, *Coagulation, *Chemical reactions, Operations, Maintenance, Waste treatment, Sewage treatment, Solids contact processes, Separation techniques, Cost analysis, Flotation, Filters, Suspension, Solid wastes, Waste disposal, Trickling filters, Tertiary treatment.

A new source of information is presented for use by engineers and industry in the planning, design and operation of present and future wastewater treatment facilities. Much of the information presented is based on the evaluation and operation of pilot, demonstration and full scale plants. The design criteria thus generated represent typical values. The manual surveys current practice in the removal of suspended solids in both traditional and advanced treatment of municipal wastewater. Specific processes are described, design considerations are discussed and results are illustrated by data from actual installations. Included are processes such as sedimentation, straining and granular media filtration which affect physical separation of solids as well as coagulation and flocculation processes which alter solids characteristics to facilitate such separation. Detailed information is also provided concerning handling and application of coagulant chemicals. Aspects of operation and maintenance pertinent to design are discussed and estimated costs of construction and operation are provided for particular processes. (Poertner)
W75-07712

WASTEWATER IRRIGATION: ITS LEGAL IMPACT,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Water Resources Research Center.
For primary bibliographic entry see Field 6E.
W75-07766

FORT LAUDERDALE, FLORIDA (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Environmental Protection Agency, Atlanta, Ga. Region IV.
Available from the National Technical Information Service, U.S. Dept. of Commerce, Springfield, Va. 22161, as EIS-FL-73-1100-F, $8.50 in paper copy, $2.25 in microfiche. July 1973. 253 p, 2 map, 15 tab, 4 graph, 2 diagram.

Descriptors: *Federal Water Pollution Control Act, *Waste water treatment, *Filtration, *Nitrification, *Chlorination, Deep wells, Irrigation, Shallow wells, Effluents, Disinfection, Septic tanks, Injection wells, Waste water(Pollution), Waste water treatment, Discharge(Water), Canals, Landfills, Incineration, Lagoons, *Florida water supply, Water shortage, Water siltation, Sludge disposal, Biological treatment.
Identifiers: *Environmental Impact Statements, *Ft. Lauderdale(Fla), Federal Water Pollution Control Act Amendments of 1972.

The proposed action consists of federal grants assistance to the City of Ft. Lauderdale, Florida, as authorized by the Federal Water Pollution Control Act. The City applied for federal funds to aid in construction of a larger and more advanced water collection and treatment system. The assistance will be utilized to improve multi-media filtration, nitrification, and (breakpoint) chlorination. Facilities necessary to insure the attainment of secondary treatment standards will also be constructed, as will be a deep well for effluent disposal. The projects beneficial environmental impacts consist of a decrease in the quantity of oxygen demanding and biostimulating materials currently being discharged into Ft. Lauderdal's waters; the improvement of chlorination, allowing better disinfection of the wastewater effluent; and the potential for population growth without the accompanying water quality degradation that would occur if the project is not built. Various alternatives considered include biological, physical, chemical, and biologication-physical-chemical hybrid treatments; ocean outfall; canal or intracoastal waterway discharge; deep well, and disposal; irrigation; septic tank; shallow well and Everglade discharge; effluent disposal methods and land surface application; land fill; ocean disposal; injection well; incineration; protein source; building material; composting; and lagooning sludge disposal methods. Comments were received from various agencies and organizations. (Gagliardi-Florida)
W75-07783

RESEARCH DEMONSTRATION PILOT STUDY OF MUNICIPAL WASTE COMPOSTING (FINAL ENVIRONMENTAL STATEMENT),
Agricultural Research Service, Washington, D.C.
T. W. Edminster.
Available from the National Technical Information Service, U.S. Dept. of Commerce, Springfield, Va. 22161, as EIS-MD-74-0148-F, $3.75 in paper copy, $2.25 in microfiche. November 20, 1973. 26 p, 3 fig.

Descriptors: *Sewage treatment, *Sewage sludge disposal, Diseases, Environmental control, Habitats, Microenvironment, Environmental sanitation, Water law, Air pollution, *Maryland.
Identifiers: *Environmental Impact Statements, *Beltsville(Md), Federal agencies, Composting.

A proposal was made to establish and operate a site to test the composting of sewage sludge and organic refuse. The project will be undertaken by the Agricultural Research Service and the Maryland Environmental Service. The compost will be used for both research and land development. Among the deleterious environmental effects of the project are the building of a large crushed-rock surface which would have to be removed for subsequent agricultural use; the use of heavy machinery; and the possible production of undesirable odors through anaerobic decomposition, and possible pathogenic contamination of surface and ground waters. Alternatives to the composting project range from no action to conducting a smaller scale operation of the same site or moving to a different site. In addition, alternatives to composting sludge are suggested such as a trenching system of sludge use on land and spreading fresh sludge on the land surface and plowing in. No long term environmental impacts will result from the pilot study since it is a temporary demonstration. In the event, however, that the project results in satisfactory composting procedure, it would have very favorable and significant environmental effects. (Proctor-Florida)
W75-07786

NORTH BROWARD COUNTY, FLORIDA (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Environmental Protection Agency, Atlanta, Ga. Region IV.
Available from the National Technical Information Service, U.S. Dept. of Commerce, Springfield, Va. 22161, as EIS-FL-73-0516-F, $6.25 in paper copy, $2.25 in microfiche. March 20, 1973. 163 p, 7 tab, 3 map.

Descriptors: *Waste water disposal, *Waste water treatment, *Water pollution treatment, *Water pollution control, Water pollution sources, Water pollution, Waste water(Pollution), Construction, Oceans, Outfall sewers, Sewage, Sewage disposal, Sewage treatment, Canals, *Florida.
Identifiers: *Environmental Impact Statements, *Broward County(Fla).

The project consists of the construction of wastewater pumping stations, forcemains, treatment plant, and water treatment plant ocean outfall in North Broward County, Florida. The primary unavoidable adverse effects are those related to actual construction such as noise, traffic, stripping of trees and foliage, and soil erosion. The project will be of benefit in establishing authority in one governmental body responsible for sewage treatment, eliminating the continued construction of small plants throughout the area. The project will make possible the exercise of tighter control as to the timing and nature of new additions to the system and as to the nature of the water discharged to the system. It will also eliminate many discharges into inland waters which result in violations of water quality standards. Alternatives considered include ocean outfalls, deep well disposal, septic tanks and doing nothing. Additionally, alternative plant sites and collection systems were considered. (Denvir-Florida)
W75-07787

HEAVY METALS REMOVAL BY THERMAL PROCESSES,
Princeton Univ., N.Y. Center for Environmental Studies.
R. T. Probstein.
In: Proceedings of the Conference 'Traces of Heavy Metals in Water: 'Removal Processes and Monitoring', November 15-16, 1973, Princeton University, Princeton, New Jersey. 24 p, 5 fig, 19 ref.

Descriptors: *Heavy metals, Removal, *Thermal properties, *Evaporation, *Freezing, *Waste water treatment, Concentrations, Scaling, Corrosion, Electrodialysis, Reverse osmosis, Effluent, Reclamation, Precipitation, Latent heat, Condensation, Heat transfer, Compression, Desalination, *Distillation, Laboratory tests.
Identifiers: Metal plating, Fluorocarbons.

Rapidly increasing world energy costs have reduced the attractiveness of standards flash and boiling distillation systems because of their low thermal performance and correspondingly high energy consumption. Thermal processes with relatively low energy consumption are vapor compression distillation and freezing. Vapor compression, although not a new process, has not been developed for the specific purpose of handling heavy metal wastewaters. Some development, pilot plant and demonstration work is required to enable the method to treat reliably the highly corrosive and scale forming waters with corrosive distillates using efficient high volume compressors and enhanced heat transfer surfaces. Freezing also appears to be quite promising, particularly since it minimizes the corrosion and scale problem. However, freezing is still in an embryonic stage from a commercial viewpoint and requires much more development and testing on heavy metal wastewaters before its potential for this application can be properly evaluated. (Rowe-Vanderbilt)
W75-07798

DEVELOPMENT AND APPLICATION OF THE WASTE-PLUS-WASTE PROCESS FOR RECOVERING METALS FROM ELECTROPLATING AND OTHER WASTES,
Bureau of Mines, Rolla, Mo. Rolla Metallurgy Research Center.
A. A. Cochran, and L. C. George.
Bureau of Mines, Report No. RI 7877, Washington, D.C., May, 1974. 18 pages, 9 fig, 10 tab, 24 ref.

Descriptors: *Heavy metals, *Waste water treatment, *Industrial wastes, *Neutralization, Economics, Resources, Cadmium, Chromium, Copper, Nickel, Zinc.
Identifiers: *Waste-plus-waste process, *Electroplating.

Laboratory-scale research was conducted to develop a new process for treating electroplating and other wastes. Various acid and alkaline cyanide wastes were combined under controlled conditions to neutralize the wastes and to almost completely precipitate the metals and cyanides. The metals were subsequently recovered for recycling: the cyanides can also be easily recycled. The process was successfully used to treat the major types of electroplating and etching wastes, containing Cd, Cr, Cu, Ni, and Zn and to treat both concentrated and dilute wastes. The economic aspects of treating concentrated electroplating, etching, and anodizing wastes are especially attractive because of the low cost of mixing two wastes, the high value of the recovered metals, and the simplicity of the recovery procedures. The filtrates from the waste-plus-waste step were relatively harmless compared with the original wastes and met Public Health Service standards for free cyanide content. Free cyanide ions were not detected in most of the filtrates; the limit of detection was 0.03 ppm. Only small amounts of HCN were produced during the neutralization; the HCN was collected and neutralized. (Pulliam-Vanderbilt)
W75-07804

SEPARATOR FOR LIQUIDS OF DIFFERENT DENSITIES,
P. Preus, and J. J. Gallagher.
U.S. Patent No. 3,862,040, 4 p, 4 fig, 3 ref; Official Gazette of the United States Patent Office, Vol 930, No 3, p 1332, January 21, 1975.

Descriptors: *Patents, *Skimming, *Waste water treatment, *Water treatment, Pollution abatement, Water pollution control, Separation techniques, Equipment, Liquid wastes.
Identifiers: *Decanting, *Gravity separation, Separators.

A separator for liquids of different densities includes a skimmer for separating the liquids, a separating tank for holding the more dense liquid from the skimmer and a concentrating tank to receive the less dense liquid from the skimmer. (Sinha-OEIS)
W75-07805

METHOD OF STERILIZING REVERSE OSMOSIS WATER TREATMENT UNITS,
Culligan, Inc., Northbrook, Ill. (assignee).
C. E. Lyall.
U.S. Patent No. 3,850,797, 3 p, 1 fig, 3 ref; Official Gazette of the United States Patent Office, Vol 928, No 4, p 1698, November 26, 1974.

Descriptors: *Patents, *Semipermeable membranes, *Reverse osmosis, *Waste water treatment, *Filtration, Membranes, Equipment, *Desalination, Hydrogen ion concentration.
Identifiers: Sterilization.

A method is disclosed for treating a reverse osmosis water treatment unit and particularly the semipermeable membrane used therein in such a manner both to sterilize and to extend the life of the membrane of the unit. This method comprises: passing an aqueous solution having a pH in the range of from 4.5 to 6 and containing formaldehyde or the like and an acid selected from the group consisting of acetic, formic, citric, fumaric and boric into the water treatment unit and through the membrane of the unit during a period of unit 'down time' and maintaining the solution in the unit and in contact with the membrane for as long a period of time as is reasonably possible and preferably until such time as the unit must again be activated. (Sinha-OEIS)
W75-07806

CONNECTION FITTING FOR WATER TREATMENT APPARATUS,
For primary bibliographic entry see Field 5F.
W75-07808

SKIMMING BLADE,
FMC Corp., Chicago, Ill. (assignee)
W. C. Bishop.
U.S. Patent No. 3,872,017, 4 p, 3 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 932, No 3, p 1080, March 18, 1975.

Descriptors: *Patents, *Pollution abatement, *Water pollution control, *Waste water treatment, Skimming, Equipment, Water quality control.
Identifiers: Water clarification, Settling tanks.

A skimming blade is used in a liquid clarification tank which has longitudinally extending weir boxes that define the outlet for receiving clarifying liquid. The skimming blade is supported on a bridge that is reciprocated above the tank along a path parallel to the direction of flow of liquid within the tank and has cutouts having bases located above the lower edge of the blade. The skimming blade is maintained in a first skimming position where the bases of the cutouts are above the liquid level while the bridge is traversing the box area of the tank and a second skimming position where the bases of the cutouts and the lower edge of the blade are located below the liquid level. (Sinha-OEIS)
W75-07812

CONDENSED WATER DECHLORINATION APPARATUS,
Hitachi Ltd., Tokyo (Japan). (assignee)
T. Teranishi, and O. Takita.
U.S. Patent No. 3,872,011, 3 p, 1 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 932, No 3, p 1079, March 18, 1975.

Descriptors: *Patents, *Thermal powerplants, *Nuclear powerplants, *Water quality control, Water treatment, Resins, Dissolved oxygen, Chlorination, Condensation, Recycling, *Waste water treatment, *Water reuse.
Identifiers: *Dechlorination, Steam condensers, Vacuum degassing.

In a condensed water dechlorination apparatus for a thermal power plant or a nuclear power plant, the performance of resin in dechlorination towers usually deteriorates after use of about one week. For this reason, it is usually necessary to regenerate the resin in each of the dechlorination towers. A system is provided for recycling the blow water to a steam condenser instead of discharging the water outwardly, the dissolved oxygen being removed by a vacuum degassing effect in the steam condenser. A control valve and an auxiliary pump, and optionally an auxiliary tank are also provided in the line from the dechlorination tower to the steam condenser so as to ensure a safe and stable operation. In order to facilitate the vacuum degassing effect in the steam condenser, it may be possible to discharge the blow water through spray nozzles into the steam condenser. (Sinha-OEIS)
W75-07813

REMOVAL OF HEAVY METAL POLLUTANTS FROM AQUEOUS MEDIA,
Celanese Corp., New York. (assignee)
H. J. Davis, and L. A. Lee.
U.S. Patent No. 3,872,001, 4 p, 5 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 932, No 3, p 1075, March 18, 1975.

Descriptors: *Waste water treatment, *Patents, *Pollution abatement, *Water pollution control, Metals, Cations, *Heavy metals, Chelation, Mercury(Metal), Polymers, Films.
Identifiers: *Polymeric films.

A process for removing pollutant heavy metal cations from an aqueous media is comprised of passing the pollutant-containing aqueous media through a substantially water insensitive, flexible base, porous polymeric film thereby forming a complex with the pollutant metal cations to be removed. The film is prepared from a polymer containing from about 0.01 to 3.0 free hydroxyl groups per gram of polymer which has been reacted with a polyfunctional carboxylic or sulfonic acid or anhydride to produce an acid-containing polymer and is subsequently contacted with a divalent metal chelate which is not subject to water degradation. (Sinha-OEIS)
W75-07815

REMOVAL OF POLLUTANTS FROM WASTEWATER,
Autotrol Corp., Milwaukee, Wis. (assignee)
W. N. Torpey.
U.S. Patent No. 3,871,999, 6 p, 6 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 932, No 3, p 1074, March 18, 1975.

Descriptors: *Patents, *Waste water treatment, *Pollution abatement, *Water pollution control, *Biological treatment, Domestic wastes, Oxidation, Denitrification, Microorganisms, Organic wastes.
Identifiers: Ammonia nitrogen, Carbonaceous matter.

A biological method is described for effecting removal of substantially all of the ammonia nitrogen as well as 85 to 95% of the carbonaceous matter present in normal domestic wastewater. The process can include a first stage which oxidizes a minor portion of the ammonia present to nitrates and a second stage that provides denitrification of remaining nitrogenous compounds. The second stage is operated in a manner excluding molecular oxygen to encourage the growth of microorganisms that use nitrate oxygen for respiration and ammonia as an energy source. (Sinha-OEIS)
W75-07816

AERATING APPARATUS HAVING BALLAST MEANS THEREFOR,
Environmental Products Inc., Richmond, Va. (assignee)
R. C. Dively.
U.S. Patent No. 3,871,581, 4 p, 4 fig, 14 ref; Official Gazette of the United States Patent Office, Vol 932, No 3, p 948, March 18, 1975.

Descriptors: *Patents, *Waste water treatment, *Aeration, *Pollution abatement, *Water pollution control, *Sewage treatment, *Industrial wastes, Equipment.

An aerating apparatus for use in sewage and industrial waste treatment systems utilizes a top-mounted motor with a submerged ballast capable of providing a stable unit. The ballast is combined with means for establishing a low loss fluid flow into a propeller driven by the motor. Water which is lifted by the propeller then engages a deflector which deflects the water substantially radially of the apparatus in order to be aerated. In a preferred form of the invention, the ballast is carried by the means utilized to establish the low loss fluid flow and is toroidal in cross section. (Sinha-OEIS)

W75-07817

WATER QUALITY ANALYSIS SYSTEM WITH MULTICIRCUIT SINGLE SHELL HEAT EXCHANGER,
Beckman Instruments, Inc., Fullerton, Calif. (assignee)
E. A. Houser, and B. W. Schwindt.
U.S. Patent No. 3,871,444, 8 p, 14 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 932, No 3, p 902, March 18, 1975.

Descriptors: *Patents, *Water quality, *Electric powerplants, *Steam, *Heat exchangers, Equipment, Powerplants, Thermal pollution, Waste water treatment.
Identifiers: Power generation plants.

A modular water quality analysis system for steam electric power generating plants includes a novel single shell multicircuit heat exchanger having means to individually vary the rate of flow of cooling water through each of the multiple circuits therein. The single heat exchanger can simultaneously cool a plurality of samples entering it at widely differing high inlet temperatures to the same lower range of outlet temperatures. The heat exchanger can be mounted on top of the system rack which contains a plurality of modules of apparatus for accepting water or steam samples from various test points in the power generating system, reducing the pressure and temperature thereof, directing and metering the flow of samples, and performing analyses for such water characteristics as pH, specific or cation conductivity, dissolved oxygen, and sodium content. Flexibility of design in the modular system also permits the same basic apparatus to be adapted to a large variety of different sizes and types of power generating plants having different analysis requirements thereby providing a custom installation for each plant which nonetheless retains all of the advantages of standardized design and equipment. (Sinha-OEIS)
W75-07818

MARINE SEWAGE TREATMENT SYSTEM FOR WATER CRAFT,
F. Humphrey.
U.S. Patent No. 3,870,634, 8 p, 7 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 932, No 2, p 637, March 11, 1975.

Descriptors: *Patents, *Sewage treatment, *Waste water treatment, *Pollution abatement, *Water pollution control, Waste disposal, Equipment.
Identifiers: Marine wastes, Water craft.

A marine sewage treatment system has a digestor unit which includes a first tank receiving the sewage effluent, a secondary treatment unit including a second tank receiving the fluid discharged from the first tank and a final filter receiving the fluid discharged from the second tank. The first and second tanks include baffles controlling the flow of fluid within the tanks. The first and second tanks each are supported via a guide and anchor assembly for automatically leveling and agitating the fluid within the first and second tanks. (Sinha-OEIS)
W75-07820

SELF-CONTAINED TERTIARY FILTER PLANT AND CHLORINATION UNIT,
W. R. Setterstrom.
U.S. Patent No. 3,870,633, 5 p, 5 fig, 12 ref; Official Gazette of the United States Patent Office, Vol 932, No 2, p 637, March 11, 1975.

Descriptors: *Patents, *Water pollution control, *Pollution abatement, *Tertiary treatment, *Waste water treatment, Equipment, Chlorination, Filters, Filtration.

A self-contained enclosure includes vertical and horizontal partitions defining a storage chamber for the sewage treatment plant effluent, and sand filter bed, a chlorination unit, a backwash storage chamber with check valves between chambers which are otherwise fluid connected for control of gravity flow. Air under pressure through ejectors force controlled fluid flow through the treatment chambers and backwash material return to the upstream primary sewage treatment plant. (Sinha-OEIS)
W75-07821

5E. Ultimate Disposal Of Wastes

WATER SUPPLY AND WASTEWATER DISPOSAL IN RURAL AREAS OF INDIA,
Greenleaf/Telesca, Miami, Fla. Environmental Sciences Dept.
For primary bibliographic entry see Field 4A.
W75-07381

THE CONFIGURATION OF CONTAMINATION ENCLAVES FROM REFUSE DISPOSAL SITES ON FLOODPLAINS,
Iowa State Univ., Ames. Dept. of Earth Sciences.
For primary bibliographic entry see Field 5B.
W75-07443

GEOHYDROLOGIC CONSIDERATIONS IN THE MANAGEMENT OF RADIOACTIVE WASTE,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 5B.
W75-07562

DEVICES FOR ONBOARD TREATMENT OF WASTES FROM VESSELS,
Thiokol Chemical Corp., Brigham City, Utah. Wasatch Div.
For primary bibliographic entry see Field 5D.
W75-07594

DESIGNING LANDFILLS TO MINIMIZE LEACHATE,
Waste Age Magazine, West Chester, Pa.
R. W. Eldredge.
Paper presented at International Public Works Congress and Equipment Show, Denver, Colorado, September 15-20, 1973. 13 p, 5 fig, 7 ref.

Descriptors: *Solid wastes, *Municipal wastes, *Environmental sanitation, *Leaching, *Leachate, *Landfills, Organic wastes, Water pollution control, Liquid wastes, Sludge disposal, Waste water treatment, Waste water(Pollution), Environmental engineering.
Identifiers: *Sanitary landfills, Leachate treatment, Landfill design.

Landfill designs minimize leaching potential by diverting surface waters, separating the fill from gound waters, and limiting the liquid content of materials placed in the fill. Care should be taken that leaching will not occur so rapidly, or in so concentrated a form, as to impair that part of the environment where the leachate flows. To solve the problem of diversion of surface and flowing sources within the site, ditches, swales, and beams are constructed on undisturbed earth. On refuse filled areas, asphalt or plastic linears with gas venting mechanisms are provided. Excavated areas, exposed springs or seeps may be tiled or guided to a surface drain, avoiding passage through the refuse. Also, daily refuse cell construction should be as compact as possible--normally six inches thick. Planting vegetation on landfills at an early stage can help eliminate percolation. It is impractical to construct an impenetrable capsule for refuse, but reducing the association of water with solid waste will reduce the amount of leachate produced. (Poertner)
W75-07679

FORT LAUDERDALE, FLORIDA (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Environmental Protection Agency, Atlanta, Ga. Region IV.
For primary bibliographic entry see Field 5D.
W75-07783

NORTH BROWARD COUNTY, FLORIDA (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Environmental Protection Agency, Atlanta, Ga. Region IV.
For primary bibliographic entry see Field 5D.
W75-07787

5F. Water Treatment and Quality Alteration

RECOVERY AND REUSE OF COAGULANTS FROM TREATMENT OF WATER AND WASTEWATER,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W75-07600

LINCOLN TRAIL AREA DEVELOPMENT DISTRICT COMPREHENSIVE WATER AND SEWER PLAN.
Schimpeler-Corradino Associates, Louisville, Ky.
For primary bibliographic entry see Field 5D.
W75-07667

PLASTIC PIPE IN COLDER CLIMATES,
Winnipeg Waterworks, Waste and Disposal Div. (Manitoba).
J. M. MacBride.
Presented at APWA International Congress and Equipment Show, Toronto, Ontario, Canada, September 14-19, 1974. 6 p.

Descriptors: *Plastic pipes, *Cold regions, *Pipelines, *Conveyance structures, *Hydraulic structures, *Canada, Hydraulic conduits, Water distribution(Applied), Water supply, Municipal water, Materials testing, Subarctic.
Identifiers: Polyvinyl chloride pipes, Polybutylene pipes, Winnipeg(Manitoba-Canada).

The Waterworks, Waste and Disposal Division of the City of Winnipeg is responsible for the supply of potable water to all users and the treatment and disposal of their sewage. The climate in Winnipeg is relatively dry. Summer temperatures in the 90's (Farenheit) are not uncommon; neither are winter extremes of more than 30 degrees below zero uncommon. Because of the cost, shortage of materials and other factors, Winnipeg's use of plastics for piping is increasing rapidly. Sewage syphons and forcemains across Winnipeg's rivers have been constructed of polyethelene in sizes varying from 18 in. to 32 in. This work was done in temperatures ranging from 10 F to 30 F. The pipe maintained an amazing amount of flexibility under these cold weather conditions. Polyvinyl chloride (PVC) pipe has so far only been used on test for water distribution mains in the city PVC pipe is also used in the transmission of chlorine solutions for water and sewage treatment. Polybutylene pipe is now being used as a service pipe in residential areas as an alternative to Type K copper. Recent impact tests carried out by the independent test laboratory for the City of Winnipeg indicates that while PVC becomes more rigid at temperatures of 0 F., it still exhibits impact strengths equal to or greater than asbestos cement pipe. All three materials, polyethelene, polyvinyl chloride, and polybutylene seem suited for use in cold weather. (Poertner)
W75-07683

AN ARCTIC WATER SUPPLY SYSTEM,
Directorate of Construction Engineering and Design Engineering, Ottawa (Ontario).
E. G. Taylor.
Paper presented to the Canadian Section Conference, American Waterworks Association, April 22, 1968. 45 p, 28 fig, 2 tab, 9 append.

Descriptors: *Water distribution(Applied), *Cold weather construction, *Cold regions, *Arctic, *Pipelines, *Water supply, Water conveyance, Water utilization, Control systems, Automatic control, Instrumentation, Monitoring, Remote control, Construction, Aluminum, Hydraulic structures, Conveyance structures, Hydraulic conduits, Canada, Tunnel construction, Consumptive use.
Identifiers: *Alert(Northwest Territories-Canada), Utilidors.

An unusual water supply and distribution system has been in operation at Alert, Northwest Territories, since the fall of 1965. The source of supply is a lake that covers some 900 acres having an average depth of about 25 feet. The water is of quite good quality. Aluminum pipe was chosen for its light weight, its corrosion resistance, and its small thermal expansion. Freezing of the water is prevented by heating the water in boilers and heating and insulating the water distribution network. Above-ground utilidors housing both water supply lines and a sewer pipeline were used in the camp area. The system was designed to provide 50 gallons per capita daily, and each pump was capable of delivering the entire day's supply. The Moyno pump is a screw-type positive displacement pump which is well suited to pumping small quantities of water against high heads. The pipeline from the lake pumphouse to the camp water house is approximately 8,000 feet long and consists of 2-inch aluminum pipe in 25-foot lengths joined with Victualic couplings. The camp water house contains facilities for metering chlorinating, filtrating, heating and storing water received from the lake. It is also the focal point of the camp distribution system and contains the pressure tank, heating system and circulating pumps. Elaborate remote control and monitoring devices have been provided. (Poertner)
W75-07684

FEASIBILITY OF 5 GPM DYNACTOR/MAGNETIC SEPARATOR SYSTEM TO TREAT SPILLED HAZARDOUS MATERIALS,
Industrial Bio-Test Labs., Inc., Northbrook, Ill.
For primary bibliographic entry see Field 5D.
W75-07706

PROCESS DESIGN MANUAL FOR SUSPENDED SOLIDS REMOVAL.
Hazen and Sawyer, New York.
For primary bibliographic entry see Field 5D.
W75-07712

CONNECTION FITTING FOR WATER TREATMENT APPARATUS,
R. Dujardyn.
U.S. Patent No. 3,861,418, 3 p, 5 fig, 9 ref; Official Gazette of the United States Patent Office, Vol 930, No 3, p 1138, January 21, 1975.

Descriptors: *Patents, *Water treatment, Equipment, Water softening, Waste water treatment.
Identifiers: Fittings.

A connection fitting for water treatment apparatus is designed in such a way that it comprises all the required connections and can be fitted, as is, to the apparatus of which it becomes an integral part. The connection fitting comprises a body having a top wall, a bottom wall and a side wall and with first, second and third passages. The first passage extends eccentrically between the bottom and top walls of the body and is adapted to receive a closure plug which can be removed. The second and third passages are parallel and L-shaped. (Sinha-OEIS)
W75-07808

ULTRA PURE WATER PROCESS AND APPARATUS,
Aqua Media, Sunnyvale, Calif. (assignee).
T. L. Faylor, and R. W. Martin.
U.S. Patent No. 3,870,033, 6 p, 6 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 932, No 2, p 451, March 11, 1975.

Descriptors: *Patents, *Water purification, *Heat exchangers, *Water treatment, Equipment, Tubes, Water quality, Quality control.
Identifiers: *Deionization.

A method and apparatus are described which produce hot deionized water having a temperature of about 170 deg F. and a deionized purity equivalent to about 18 megohm electrical resistivity at 25C. The water purification system produces ultra pure water in production quantities for industrial and commercial uses. It combines a large capacity storage tank with a pretreatment circuit and an ultra pure water recirculation loop in a way that has a number of significant advantages. The heat exchanger includes a tank at least partially filled with liquid, a coiled tube of inert plastic tubing immersed in the liquid in the tank and having an inlet connected to the inlet supply and having an outlet connected to the outlet means and a heating element disposed within and spaced from the coil for direct heating of the liquid in the tank and for indirect heating of the deionized water in the interior of the tubing. (Sinha-OEIS)
W75-07810

BACTERICIDAL WATER PURIFIER FOR DECHLORINATED WATER,
Matsushita Electric Industrial Co. Ltd., Osaka (Japan). (assignee)
A. Nishino, Y. Iura, M. Kubo, and M. Tateisi.
U.S. Patent No. 3,872,013, 4 p, 7 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 932, No 3, p 1079, March 18, 1975.

Descriptors: *Patents, *Membranes, *Bactericides, *Water purification, *Water quality control, Activated carbon, Calcium carbonate, Filtration, Heavy metals, Filters, Biological membranes, Potable water, *Water treatment.
Identifiers: Dechlorination, Sterilization.

A water purifier for drinking water has one or more bactericidal membranes which inhibit the propagation of bacteria in the purifier after removal of chlorine or its derivatives from the supplied water. Porous sheets of a water insoluble material such as a synthetic fiber are coated with a bactericidal substance such as a sparingly soluble halide of a Group IB heavy metal. These are placed between the activated carbon layer and outlet of a water purifier. Additional provision of calcium carbonate granules in the purifier is effective in improving the bactericidal efficiency. (Sinha-OEIS)
W75-07811

5G. Water Quality Control

METHODS OF COMMUNICATING ACTIVITIES IN POLLUTION ABATEMENT BY FIVE HUNDRED MAJOR INDUSTRIAL CORPORATIONS IN THE UNITED STATES,
Texas A and M Univ., College Station. Environmental Quality Program.
C. A. Quinn.
EQN Note 16, April 1974. 86 p, 19 tab, 7 ref. Price: $3.00.

Descriptors: *Industries, *Pollution abatement, *Communication, Administrative costs, Surveys, Attitudes, Social aspects, *Water pollution control, Water quality control.
Identifiers: *Public relations, *Advertising, Major corporations.

The extent to which the top 500 United States industrial corporations (as determined according to sales by Fortune magazine, May 1972) have established and implemented public relations programs to inform their various publics of their pollution abatement activities was investigated by a questionnaire sent to the chief executive officer of each firm. The areas examined included (1) company characteristics, (2) type of pollution abatement public relations program, (3) the programs' personnel characteristics, finances, and effectiveness, and (4) the company executives' attitudes toward the communication of pollution abatement activities. The responses indicated that large firms (sales of two billion dollars or more) and pollution prone industries (chemicals, foods, paper and wood products, petroleum refining, metal manufacturing, rubber, and motor vehicles and parts) were most likely to have established a pollution abatement public relations program, with the percentage of companies with programs declining for smaller firms and in industries less pollution prone. Generally, pollution abatement public relations programs utilized traditional mass media and were integrated in the general public relations activities. A majority of responding company executives believed such programs to be important, but these private beliefs had little effect on the size of their company's program. (Becker-Wisconsin)
W75-07359

INFLUENCES OF WASTEWATER MANAGEMENT ON LAND USE: TAHOE BASIN 1950-1972,
California Univ., Santa Cruz.
For primary bibliographic entry see Field 5D.
W75-07362

THE INTERRELATIONSHIP OF ECONOMIC DEVELOPMENT AND ENVIRONMENTAL QUALITY IN THE UPPER COLORADO RIVER BASIN: AN INTERINDUSTRY ANALYSIS,
Colorado Univ., Boulder. Dept. of Economics.
For primary bibliographic entry see Field 6B.
W75-07377

SOUTHWEST ENERGY STUDY. SUMMARY REPORT.
Southwest Energy Federal Task Force.
For primary bibliographic entry see Field 6B.
W75-07380

A GENERAL LINEAR APPROACH TO STREAM WATER QUALITY MODELING,
IBM Federal Systems Div., Gaithersburg, Md.
For primary bibliographic entry see Field 5B.
W75-07382

AQUATIC PLANT HARVESTING: DEVELOPMENT OF HIGH-SPEED HARVESTERS AND PROCESSING AND UTILIZATION OF HARVESTED VEGETATION,
Wisconsin Univ., Madison. Dept. of Agricultural Engineering; and Wisconsin Univ., Madison. Dept. of Mechanical Engineering.
For primary bibliographic entry see Field 4A.
W75-07397

EFFICIENT USE OF WATER - POLICY AND PROBLEMS,
Ministry of Agriculture, Tel-Aviv (Israel). Water Commission.
For primary bibliographic entry see Field 6D.
W75-07401

REPORT TO THE CONGRESS ON OCEAN POLLUTION, OVERFISHING, AND OFFSHORE

DEVELOPMENT; JULY 1973 THROUGH JUNE 1974.
National Oceanic and Atmospheric Administration, Washington, D.C.
For primary bibliographic entry see Field 5B.
W75-07405

ENVIRONMENTAL STUDIES OF AN ARCTIC ESTUARINE SYSTEM--FINAL REPORT,
Alaska Univ., College. Marine Science Inst.
For primary bibliographic entry see Field 2L.
W75-07417

INVESTIGATION AND REHABILITATION OF A BRINE-CONTAMINATED AQUIFER,
Engineering Enterprises, Inc., Norman, Okla.
For primary bibliographic entry see Field 5B.
W75-07441

WATER RESOURCES,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
For primary bibliographic entry see Field 7B.
W75-07494

LAND AND WATER USE IN OREGON,
Oregon State Univ., Corvallis. Water Resources Research Inst.
For primary bibliographic entry see Field 6B.
W75-07507

THE PRACTICAL LIMITS OF POLLUTION CONTROL TECHNOLOGY,
Oregon State Univ., Corvallis. Dept. of Civil Engineering.
F. D. Schaumburg.
In: Land and Water Use in Oregon; Seminar conducted by Oregon State University, Spring Quarter 1974, Water Resources Research Institute, Corvallis, Oregon, p 1-7 , July 1974.

Descriptors: *Environmental control , *Legal aspects, *Water quality standards, *Management, Regulation, Water quality control, Government finance, Legislation, Water law, Water policy, Political aspects, Environmental effects, Balance of nature, Environmental engineering, Water pollution, Administrative agencies, Water treatment, Water pollution control, Environment, Water quality act, Ecology, Economic feasibility, Economics.

The need for a more coordinated approach to environmental problems was stressed. It was argued that our present laws and procedures tend to divide the environment into water, land, and air problems. Solutions to water pollution problems, for instance, are attempted without regard to the effects of the water treatment on the land and air. It was pointed out that the 1972 Amendments of the Water Pollution Control Act set up goals that are impossible to achieve thermodynamically, technologically, and economically. Greater technological input in the decision-making process is needed. Too many of the positions of authority have gone to nontechnical persons, most of them lawyers. More input from industry and the public is needed in environmental management. State and federal agencies should not force industries of municipalities past the point where justifiable environmental good is achieved. More cooperation is needed, rather than the largely adversary procedure that now exists. (See also W75-0750) (Sims-ISWS)
W75-07508

WILLAMETTE RIVER PARKS SYSTEM,
Willamette River Parks System, Salem, Oreg.
For primary bibliographic entry see Field 6B.
W75-07513

WATER QUALITY PLANNING FOR THE DELAWARE ESTUARY - AN EXAMPLE,
Rutgers - the State Univ., New Brunswick, N.J. Water Resources Research Inst.
W. Whipple, Jr.
Water Resources Bulletin, Vol 11, No 2, p 300-350, April 1975. 1 tab, 7 ref.

Descriptors: Water resources, *Planning, *Water quality control, Water pollution sources, Water pollution treatment, Municipal wastes, Reaeration, *Water Quality Act, *Urban runoff, Estuaries.
Identifiers: Non-point pollution sources, *Instream aeration, *Instream oxygenation, *Delaware estuary.

The Delaware Estuary has been intensively studied but the planning for water quality control is very unsatisfactory, including the most recent interagency plan. Earlier planning by the FWPCA and the Delaware River Basin Commission was better; but this planning appears to have been halted and perhaps superseded by the provisions of PL 92-500. The Tocks Island reservoir planned to maintain minimum flows may never be built on account of environmental objections; but the consequences of such a decision are not being faced. Meanwhile recent research indicates that urban runoff will be a major influence possibly adding a load of as much as 500,000 lbs. of BOD in a single storm. Unit costs of treating urban runoff pollution are very high, due to its extreme variability. Artificial aeration or oxygenation may provide a more economical means of improving the dissolved oxygen regimen, as compared to primary treatment of urban runoff, or tertiary treatment of effluents. In any event planning on a regional basis is desirable in the Delaware and elsewhere, and PL 92-500 may need to be changed to facilitate it.
W75-07519

FUTURE DIRECTIONS IN ENVIRONMENTAL LEGISLATION,
For primary bibliographic entry see Field 6E.
W75-07532

FOSSIL FUELS AND POWER GENERATION IN THE COLORADO RIVER BASIN,
Brigham Young Univ., Provo, Utah. Dept. of Botany and Range Science.
For primary bibliographic entry see Field 3E.
W75-07537

POWER GENERATION AND THE COLORADO RIVER BASIN,
Utah Power and Light Co., Salt Lake City.
For primary bibliographic entry see Field 3E.
W75-07538

TRANSPORTATION AND REGIONAL ENVIRONMENTAL MANAGEMENT,
Wyoming Univ., Laramie. Dept. of Economics; and Div. of Business and Economic Research.
For primary bibliographic entry see Field 6B.
W75-07539

RESOURCE ALLOCATION AND MANAGEMENT IN THE COLORADO RIVER BASIN,
Utah State Univ., Logan. Dept. of Political Science.
For primary bibliographic entry see Field 6E.
W75-07543

SEDIMENT IN IRRIGATION AND DRAINAGE WATERS AND SEDIMENT INPUTS AND OUTPUTS FOR TWO LARGE TRACTS IN SOUTHERN IDAHO,
Agricultural Research Service, Kimberly, Idaho. Snake River Conservation Research Center.
M. J. Brown, D. L. Carter, and J. A. Bondurant.
Journal of Environmental Quality, Vol 3, No 4, p 347-351, October-December, 1974. 1 fig, 3 tab, 10 ref.

Descriptors: *Irrigation water, *Sediment control, *Sediment transport, *Surface runoff, *Irrigation operation and maintenance, Erosion, Drainage water, Infiltration, *Idaho.
Identifiers: *Sediment retention ponds, Snake River(Idaho).

Sediment inputs from Snake River irrigation water and sediment losses back to the river were measured from two large irrigated tracts in Southern Idaho. A net sediment accumulation of 0.69 metric tons/ha onto the Northside tract was determined, but a net loss of 0.46 metric tons/ha occurred on the Twin Falls tract. Much of the difference was the result of a drainage system constructed to grade on the Northside tract whereas most drains on the Twin Falls tract are natural channels with steeper gradients. Erosion loss from farms could be reduced by more careful water use and construction of on-farm sediment retention ponds. These ponds would not only reduce the amount of sediment returning to the river, but would also reduce the costs of sediment removal from drains and canals. The sediment retention ponds could provide fill for low areas and for landscaping, and additional benefits could include nitrogen removal by phytoplankton, and recreation such as water sports and fishing. (Mastic-Arizona)
W75-07546

GENERALIZED STREAM TEMPERATURE ANALYSIS SYSTEM,
Geological Survey, Bay Saint Louis, Miss. Gulf Coast Hydroscience Center.
For primary bibliographic entry see Field 5B.
W75-07561

ENERGY FROM COAL: GUIDELINES FOR THE PREPARATION OF ENVIRONMENTAL IMPACT STATEMENTS,
Battelle Columbus Labs., Ohio.
For primary bibliographic entry see Field 6G.
W75-07590

AN EVALUATION OF THE USE OF WASTE HEAT FOR SOIL WARMING IN THE SOUTHEAST,
North Carolina State Univ., Raleigh. Dept. of Biological and Agricultural Engineering.
For primary bibliographic entry see Field 3C.
W75-07599

FUTURE DREDGING QUANTITIES IN THE GREAT LAKES,
Eastern Michigan Univ., Ypsilanti. Dept. of Geography and Geology.
C. N. Raphael, E. Jaworski, C. F. Ojala, and D. S. Turner.
Environmental Protection Agency, Report EPA-660/3-74-029, December 1974. 219 p, 20 fig, 78 tab, 55 ref. R-801062.

Descriptors: *Great Lakes, *Dredging, Disposal, Lakes, Water policy, Sedimentation, Navigation, Water levels, *Projections, United States, Canada, Water pollution control.
Identifiers: Lake levels, *Disposal sites(Lakes).

Based on historical records, an overview and projection of U.S. and Canadian dredging quantities in the Great Lakes are presented. Using current pollution criteria, future quantities of polluted maintenance dredging are estimated for each lake. Recent environmental policies have influenced dredging and particularly disposal practices. These policies, as well as sedimentation, lake levels, and economic factors are discussed in relation to dredging. During the next decade, maintenance and private dredging volumes will not change significantly, whereas new work will decrease. As in

the past, most maintenance dredging will occur in U.S. projects, particularly in Lake Erie. A factor which will determine future U.S. maintenance dredging is the availability of confined disposal sites. If the 62 sites are completed for commercial harbors as planned, 300,000 of the 6.45 million cubic yards of annual projected polluted spoil will not have disposal facilities. Where pollution elimination systems are in use, shoaling in some industrial harbors may be decreasing. Although long-term lake levels are not predictable, an inverse relationship between maintenance dredging and lake levels is evident. (EPA)
W75-07603

PHYTOPLANKTON COMPOSITION AND ABUNDANCE IN LAKE ONTARIO DURING IFYGL,
Michigan Univ., Ann Arbor. Great Lake Research Div.
For primary bibliographic entry see Field 5C.
W75-07604

THE SIGNIFICANCE AND CONTROL OF WASTEWATER FLOATABLES IN COASTAL WATERS,
California Univ., Berkeley. Sanitary Engineering Research Lab.
R. E. Selleck, L. W. Bracewell, and R. Carter.
Environmental Protection Agency, Report EPA 660/3-74/016, January 1974. 119 p, 31 fig, 29 tab, 19 ref. 1BA025. 800373.

Descriptors: *Water pollution control, Waste water disposal, Methodology, *California, Sampling, Regulation, Path of pollutants.
Identifiers: *Ocean outfalls, Surface pollution, Southern California Bight, Surface floatables, Surface films, Surface slicks.

Significance of flotage derived from submerged primary effluent plumes in the Southern California Bight is evaluated in terms of three components: particulates greater than or equal to 0.5 mm in size, particulates less than or equal to 0.1 mm in size, and surface film materials. The sampling methods utilized to collect the flotage from the surface are described in detail. The surface film and microparticulates were captured by fabric screen samplers developed during the study. The large particulates penetrated the ocean thermocline and gathered on the surface in profusion. The grease and wax portions of the particulates could be measured reliably with hexane extraction, with the mass of HEM of sewage origin being in the order of a metric ton on the water surface within the study area. Such particulates contained considerable numbers of coliform bacteria but little PCB compunds or pesticides. The surface film materials and/or micro-particulates contained significant concentrations of coliform organisms and PCB compounds, but not pesticides. The HEM derived from this type of flotage may have amounted to 300 kg on the water surface within the study area in July 1973. Regulations for controlling the concentration of flotage on the ocean surface are suggested after considerable discussion. (EPA)
W75-07606

FORMAL PLANNING AND REPORTING SYSTEM: PROCEDURAL MANUAL,
Environmental Protection Agency, Washington, D.C. Office of Resources Management.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-227 114, $5.75 in paper copy, $2.25 in microfiche. February 1973. 137 p, 8 append.

Descriptors: *Project planning, *Administration, *Regions, Budgeting, *Federal project policy, Pollution abatement, State governments.
Identifiers: Reporting, *Decentralization, Program guidance decisions, Procedure manual.

Convinced that a decentralized organization will most effectively implement programs, the responsibilities of both the headquarters and the regional Environmental Protection Agency offices are prescribed. The headquarters must communicate its objectives and strategy to the regions and the regions must show that they understand the strategy and are getting the job done. An output-oriented planning and reporting system that obtains commitments to specific outputs and reports progress and problems in a timely fashion is proposed as the communications and feedback mechanism between the headquarters and regional EPA offices. The system delineates procedures for long-term budgetary resources allocation and program guidance decisions, for annual and mid-term program and accomplishment plans, for sweeping resource allocation changes, and for coordination and reporting within and between levels. The roles of assistant and regional administrators in the planning and reporting system are described. For the evaluation of an output-oriented system, the precision of output measures is a limitation of a system not based on profits. The proxies used by EPA as indicators of ultimate public welfare are ambient air and water quality. Although they are important indicators, these output measures cannot be used as the final measure for making allocation and program guidance decisions. (Becker-Wisconsin)
W75-07612

DEVELOPMENT OF AN APPROACH TO IDENTIFICATION OF EMERGING TECHNOLOGY AND DEMONSTRATION OPPORTUNITIES,
Battelle Columbus Labs., Ohio.
H. Nack, K. Murthy, E. Stambaugh, H. Carlson, and G. R. Smithson.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-233 646, $8.50 in paper copy, $2.25 in microfiche. EPA Report No. EPA-650/2-74-049, May 1074. 270 p, 26 fig, 7 tab, 12 ref.

Descriptors: *Pollution abatement, *Air pollution, *Environmental effects, *Government supports, *Industrial wastes, Industrial production, *Technology, Metallurgy, Oil industry, Pilot plants, Systems analysis.
Identifiers: *New process technology, *Petroleum refining industry, *Secondary nonferrous metal industry, Process profiles, Industry trends, Government-industry joint projects.

The petroleum refining and the secondary nonferrous metals industries were studied to develop an approach appropriate for the assessment of environmental effects associated with their activities and for the identification of new technology which could be used to minimize adverse environmental effects. A new methodology for characterizing major industries from the standpoint of their present environmental impact and for assessing the probable effect of 'emerging process technology' on environmental considerations is viewed by the EPA as the basis for selecting industries that need help in air pollution control. The approach developed includes (1) a process profile for each industry, noting the companies of importance, raw materials used, processes employed, and their products and wastes, (2) an examination of the profiles by experts from each industry in order to verify the accuracy and completeness of the profiles and to identify trends of the industry, (3) an assessment of emerging technology (potential for helping to abate existing environmental problems), and identification of candidate demonstration projects, and an examination of the feasibility of jointly sponsored government-industry projects. The role of industry esperts is important to this approach. Since the two industries studied here have substantially different characteristics, this approach has general applicability. (Becker-Wisconsin)
W75-07617

MINIMIZING THE SALT BURDENS OF IRRIGATION DRAINAGE WATERS,
Agricultural Research Service, Riverside, Calif. Salinity Lab.
J. D. Rhodes, J. D. Oster, R. D. Ingvalson, J. M. Tucker, and M. Clark.
Journal of Environmental Quality, Vol 3, No 4, p 311-316, October-December, 1974. 7 tab, 7 ref.

Descriptors: *Irrigation water, *Drainage water, *Alfalfa, *Water quality, *Irrigation efficiency, Leaching, Salts, Soil profiles, Salt balance, Water pollution, Water pollution control, Soil water movement, Weathering, Lysimeters.

Irrigation of alfalfa using waters synthesized to represent eight important river waters of the western U.S. was carried out in a controlled lysimeter experiment. Results showed that minimizing the quantity of drainage water gives the smallest possible return of applied salts in the return flow. Reasons for this effect are: (1) it maximizes the precipitation of carbonate minerals and gypsum in the soil, (2) it minimizes soil mineral weathering and the dissolution of salts previously deposited in the soil, and (3) it maximizes the amount of soluble salt diverted in the water that is retained in storage in the soil profile and not returned in the drainage water. These results point out the inadequacy of the assumption of salt balance used as the basis of many irrigation management and water quality evaluation practices. In addition, reducing the leaching fraction by increasing irrigation efficiency reduces the salt burden of drainage waters and minimizes their pollution effects. (Mastic-Arizona)
W75-07620

CONSIDERATIONS FOR ANALYSIS OF INFILTRATION-INFLOW,
National Environmental Research Center, Cincinnati, Ohio. Advanced Waste Treatment Research Lab.
For primary bibliographic entry see Field 5D.
W75-07664

LAND APPLICATION OF WASTEWATER AT COLORADO SPRINGS,
Colorado Springs Dept. of Public Utilities, Colo. Wastewater Div.
B. A. Kocerha.
Paper presented at the APWA International Congress and Equipment Show, Denver, Colorado, September 1973. 4 p.

Descriptors: *Wastewater, *Waste water treatment, *Water conservation, *Irrigation water, *Waste water disposal, *Colorado, Water demand, Droughts, Water resources development, Sanitary engineering.
Identifiers: *Colorado Springs, *Land application of waste water.

Due to severe drought in the late 1950's, the City of Colorado Springs, Colorado, considered developing its wastewater treatment plant for irrigation purposes. In 1960 a non-potable water treatment system was installed at the plant to supplant the potable supply. The non-potable treatment plant, supplied by the secondary-treated and disinfected wastewater treatment plant effluent, consisted fo pressure-type rapid sand filters followed by chlorination. This treatment was intended to reduce the BOD and suspended solid levels and was designed to treat between 250,000 and 2 million gallons of water per day to be used for land irrigation. Concurrent with the construction of a tertiary treatment plant in 1970, four dual-media (coal and sand) gravity filters were installed to replace the pressure-sand filters. The total cost for non-potable water at Colorado Springs is 11 cents per 1000 gallons. This includes the cost of secondary treatment, sand filtration and chlorination. In 1966, Colorado College analyzed soil samples taken from irrigated land area for pH, phosphates, nitrogen, and plugging conditions.

Nothing was found which could be considered harmful with respect to irrigation by reclaimed wastewater. (Poertner)
W75-07670

IS THE REFUSE ACT PERMIT PROGRAM LEGAL AND LOGICAL,
Rust Engineering Co., Pittsburgh, Pa.
L. R. Robinson.
In: Water and Sewage Works, January 1972. p 50-53, 5 ref.

Descriptors: *Water quality, *Water quality control, *Discharge(Water), *Water Quality Act, *Rivers and Harbors Act, *Navigable rivers, Navigable waters, Navigation, Pollutants, Pollution abatement, Pollutant identification, Water pollution, Federal Water Pollution Control Act, Environmental control, Federal government, Water law, Waste water disposal.

In July 1970, President Nixon established the Environmental Protection Agency (EPA) to set and enforce standards for air and water quality. Three months later, he transferred primary authority for industrial wastewater control from the EPA to the Secretary of the Army. President Nixon based his action on the United States River and Harbors Act of 1899 and established the Refuse Act Permit Program. This law, interpreted by the President, had a definite bearing on water pollution and the permit program would stop the discharge of refuse matter in specific cases unless the Army Corps of Engineers provided a permit. The obvious intent of the Congress in 1899 was to prevent obstructions to navigation when it wrote the Rivers and Harbors Act. That adequate Federal water pollution statutes had not yet been enacted led Congress to pass the Water Quality Act of 1965. The Refuse Act Permit Program should be cancelled. If standards established under the Water Quality Act of 1965 are insufficient and if additional enforcement mechanisms are needed, the EPA should be given additional authority by the Congress. (Poertner)
W75-07671

WATER QUALITY CONTROL PLAN: SAN FRANCISCO BAY BASIN, CALIFORNIA,
Water Resources Engineers, Inc., Walnut Creek, Calif; and Yoder, Trotter, Orlob and Associates, Walnut Creek, Calif.
State Water Resources Control Board, Sacramento, California, November, 1974. 62 p, 28 fig, 15 tab.

Descriptors: *Water pollution control, *Water quality control, *Bays, *Water policy, *California, *Planning, Water resources, Effluents, Land use, Population, Basic data collection, Waste water treatment, Environmental control, Environmental effects, Wetlands, Environmental engineering, Water resources development, Oil spills, Federal Water Pollution Control Act.
Identifiers: *San Francisco Bay Basin, Water quality control plan.

The basic purpose of the State Board's basin planning effort is to ascertain future direction of water quality control management for protection of California's waters. Water quality objectives recommended here for the protection of beneficial uses were developed from data reviewed during this study and from the literature, including published and unpublished reports. An assessment of existing and anticipated water quality problems involves identifying and quantifying point and diffuse (nonpoint) waste loads, evaluating by mathematical modeling techniques, the relative effect of future waste loads on the aquatic environment, and classifying basin receiving water segments in regard to pollution problems. Although municipal wastewater treatment and disposal facility improvements are emphasized, additional control measures are recommended for industrial wastewaters, urban runoff, agricultural systems, construction activities and dredging operations within the Basin. Further control actions for the State and Regional Boards as well as other agencies associated with water pollution control are recommended, including a surveillance program for measuring the effect of the Basin Plan. (Poertner)
W75-07673

FLOOD CONTROL IN COOK COUNTY,
League of Women Voters of Chicago, Ill.
For primary bibliographic entry see Field 4A.
W75-07674

RATTLESNAKE CREEK STUDY,
Wichita Water Dept., Kans.
For primary bibliographic entry see Field 4A.
W75-07676

USE OF MODELING FOR PLANNING STORM WATER STRATEGIES,
Florida Univ., Gainesville.
W. C. Huber.
Presented at the 1974 International Public Works Congress and Equipment Show, Toronto, Ontario, Canada, September 1974. 10 p, 6 fig, 3 tab, 19 ref.

Descriptors: *Storm water, *Runoff, *Mathematical models, *Planning, *Design, *Operations, Infiltration, Urban runoff, Storm runoff, Snowmelt, Effective precipitation, Average runoff, Surface runoff, Model studies, Computer models, Synthetic hydrology, Storage, Drainage engineering.

The overall objective of urban runoff models is to serve as aids to decision making for abatement of water quantity and quality problems due to urban storm water and combined sewer runoff. An urban runoff model is simply a group of mathematical expressions that simulate the physics of conversion of rainfall to runoff. Superimposed upon this process may be the related processes of dry weather flow and infiltration, snow melt, treatment and storage, and, of course, generation of water quality parameters. The modeling process may usually be subdivided into three modeling objectives: planning, design, and operation. Planning models are used for an overall assessment of the urban runoff problem as well as estimates of the effectiveness and costs of abatement procedures. Design models are oriented toward the detailed simulation of a single storm event. They provide a complete description of flow and pollutant routing from the point of rainfall through the entire urban runoff system and often into the receiving waters as well. Operational models are used to produce actual control decisions during a storm event. Rainfall is entered from telemetered stations and the model is used to predict system responses a short time into the future. Modeling offers a useful and cost-effective means of planning for storm water control. (Poertner)
W75-07677

ECONOMICS OF COMBINED SEWAGE DETENTION FACILITIES,
San Francisco City and County Dept. of Public Works, Calif.
R. T. Cockburn.
Prepared for the APWA Urban Drainage Workshop, San Francisco, California, January 22-23, 1975. 31 p, 21 fig, 6 ref.

Descriptors: *Waste water treatment, *Storm runoff, *Storm surge, *Water quality, *Water quality control, *Combined sewers, Overflow, Sewage treatment, Mathematical models, Sewage, Storage, Discharge(Water), California.
Identifiers: San Francisco(California).

The City and County of San Francisco (CCSF) operates three waste water treatment plants with a combined sanitary capacity of 100 mgd and an interceptor system of approximately 300 mgd to service 43 separate combined sewer districts. The system has two major inadequacies. The dry weather interception, collection, treatment and disposal system, is inadequate to handle the wet weather flows occurring in the system. Effluent from the City's three treatment plants violates existing standards and quality levels required by State and Federal policy. After careful study of the San Francisco system it was determined that San Francisco should retain the combined sewer system which, when adequately controlled by sufficient storage and treatment capacity, provides a higher level of water quality protection than a separate system. Separation would result in little or no benefit at great cost. Total elimination of degradation of the waters contiguous to San Francisco cannot be attained solely by control of discharges from San Francisco. Control of 90% of the volumes now overflowing will reduce the present 82 overflows to 81 annually; the receiving water bacterial violations will be reduced from 170 days/year to 60 days. Treatment of weather discharges must provide substantially complete removal of settleable and floatable materials plus sufficient removal to meet requirements of water contact sports standards on the beaches. (Poertner)
W75-07680

APPLICATION AND TESTING OF THE EPA STORMWATER MANAGEMENT MODEL TO GREENFIELD, MASSACHUSETTS,
Massachusetts Univ., Amherst. Dept. of Civil Engineering.
T. K. Jewell, P. A. Mangarella, and F. A. DiGiano.
In: Proceedings of National Symposium on Urban Rainfall and Runoff and Sediment Control, University of Kentucky, Lexington, July 29-31, 1974. p 61-71, 7 fig, 4 ref.

Descriptors: *Storm water, *Runoff, *Mathematical models, *Planning, *Design, *Operations, Infiltration, Urban runoff, Storm runoff, Effective precipitation, Average runoff, Surface runoff, Model studies, Computer models, Synthetic hydrology, Massachusetts.
Identifiers: *Greenfield(Massachusetts).

The Storm Water Management Model (SWMM) was used to predict quantity and suspended solids content of urban storm water runoff from a 547 acre test basin in Greenfield, Massachusetts. A sensitivity analysis of the input parameters for the runoff portion of the simulation program has been made. Initial comparison was made utilizing synthetic rainfall data. An evaluation of the predictive capability of the three grids, compared with measured quantity and quality, is now in progress. Tentative guidelines have been developed that will assist potential users of this type of urban storm water runoff model. The program cannot itself design drainage systems or treatment facilities. It can perform many repetitive calculations to predict and route storm water and pollutants. If accurate input data is provided and the proper interpretation is made of the output, the SWMM can provide very accurate data upon which engineering design decisions can be made. (Poertner)
W75-07681

IMPACT OF THE USE OF MICROORGANISMS ON THE AQUATIC ENVIRONMENT,
Environmental Protection Agency, Gulf Breeze, Fla. Gulf Breeze Environmental Research Lab.
For primary bibliographic entry see Field 5C.
W75-07687

LIMESTONE AND LIMESTONE-LIME NEUTRALIZATION OF ACID MINE DRAINAGE,
Environmental Protection Agency, Rivesville, W. Va. Crown Mine Drainage Control Field Site.
For primary bibliographic entry see Field 5D.
W75-07688

OIL SPILL AND OIL POLLUTION REPORTS JULY 1974 - OCTOBER 1974,
California Univ., Santa Barbara. Marine Science Inst.
F. A. DeWitt, Jr., and P. Melvin.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-240 719, $7.25 in paper copy, $2.25 in microfiche. Environmental Protection Agency Cincinnati, Ohio. Report EPA-670/2-75-003, March 1975. 205 p, 437 ref. R-803063.

Descriptors: *Bibliographies, *Oil pollution, *Oil spills, Oil wastes, Patents, *Water pollution control, Documentation, Research and development.

The July 1974 - October 1974 Oil Spill and Oil Pollution Reports is the first quarterly compilation of oil spill events and oil pollution report summaries. Presented are: (a) summaries of oil spill events; (b) summaries and bibliographic literature citations; (c) summaries of current research projects; and (d) patent summaries. (EPA)
W75-07689

MINE DRAINAGE POLLUTION CONTROL DEMONSTRATION GRANT PROCEDURES AND REQUIREMENTS,
NUS Corp., Rockville, Md.
F. J. Zaval, and R. A. Burns.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-230 709, $12.25 in paper copy, $2.25 in microfiche. Environmental Protection Agency, Cincinnati, Ohio. Report EPA-670/2-74-003, October 1974. 99 p, 15 fig. 68-03-0268.

Descriptors: *Grants, *Mine drainage, Financing, *Water polluton control, Mining engineering, Reclamation.
Identifiers: *Mine drainage pollution.

Procedures and requirements are provided for use by all individuals considering or participating in Section 107 grant demonstration projects authorized by Federal Water Pollution Control Act Amendments of 1972. The report provides an interpretation of Section 107, defines the procedures and requirements for grant applicants, and discusses all phases of deomonstration projects, including monitoring requirements and reports. (EPA)
W75-07690

URBAN STORMWATER MANAGEMENT AND TECHNOLOGY: AN ASSESSMENT,
Metcalf and Eddy, Inc., Palo Alto, Calif.
For primary bibliographic entry see Field 5D.
W75-07692

CRANKCASE DRAINAGE FROM IN-SERVICE OUTBOARD MOTORS,
Southwest Research Inst., San Antonio, Tex. Dept. of Emissions Research.
For primary bibliographic entry see Field 5B.
W75-07696

POLLUTED GROUNDWATER: ESTIMATING THE EFFECTS OF MAN'S ACTIVITIES,
General Electric Co., Santa Barbara, Calif. Center for Advanced Studies.
For primary bibliographic entry see Field 5B.
W75-07698

CHARACTERIZATION OF VESSEL WASTES IN DULUTH-SUPERIOR HARBOR,
Environmental Quality Systems, Inc., Rockville, Md.
For primary bibliographic entry see Field 5B.
W75-07701

STATE-OF-THE-ART FOR THE INORGANIC CHEMICALS INDUSTRY: INDUSTRIAL INORGANIC GASES,
Illinois Inst. of Tech., Chicago. Dept. of Environmental Engineering.
For primary bibliographic entry see Field 5B.
W75-07708

STATE-OF-THE-ART FOR THE INORGANIC CHEMICALS INDUSTRY: INORGANIC PESTICIDES,
Illinois Inst. of Tech., Chicago. Dept. of Environmental Engineering.
For primary bibliographic entry see Field 5B.
W75-07709

RATIONALE AND METHODOLOGY FOR MONITORING GROUNDWATER POLLUTED BY MINING ACTIVITIES,
General Electric Co., Santa Barbara, Calif. Center for Advanced Studies.
For primary bibliographic entry see Field 5B.
W75-07710

THE WATER QUALITY AND TIDAL FLUSHING CHARACTERISTICS OF THREE SMALL BOAT BASINS; DES MOINES MARINA, EDMONDS HARBOR, AND NEWPORT SHORES,
Washington Univ., Seattle. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W75-07726

GOVERNMENT VIEWS ON WATER POLLUTION CONTROL,
Federal Water Pollution Control Administration, Washington, D.C.
K. Biglane.
Journal of Petroleum Technology, Vol 23, p 829-831, July 1971.

Descriptors: *Oil industry, *Water pollution sources, *Oil pollution, *Oil spills, *Federal Water Pollution Control Act, *Federal government, Water pollution, Water law, Environmental effects, Law enforcement, Legal aspects, Waste water disposal, Legislation, Disasters.

The federal government is anxious to assist in the creation and operation of pollution control programs and facilities, but expects the cost of clean water to be shared by both public and private interests. Damage to the environment by increasing amounts of oil pollution must be ameliorated. This may be accomplished by minimizing the risks of accidental oil spills through the use of adequate prevention measures and prosecution of careless polluters. The amount of oil discharged in normal operations must be reduced by using new procedures and equipment. A law providing for aggressive federal oil pollution control was contained in amendments to the Federal Water Pollution Control Act entitled the Water Quality Improvement Act of 1970. The act prohibits the discharge of harmful quantities of oil. Civil and criminal penalties, and the costs of any oil spill cleanup are to be borne by the discharger. One of the most significant provisions of the Act is that preventive regulations be issued. The regulations will require that failsafe design concepts, operations control procedures, and safety and sensor mechanisms be applied to the oil industry. (Sperling-Florida)
W75-07760

UNITED STATES V. RESERVE MINING CO. (ACTION ON REMAND FROM EIGHTH CIRCUIT ON SUIT TO ENJOIN MINING CO FROM DISCHARGING CARCINOGENICS INTO INTERSTATE WATERS).
380 F. Supp. 11 (D. Minn. 1974).

Descriptors: *Minnesota, *Lake Superior, *Public health, *Mine wastes, *Asbestos, United States, Judicial decisions, Industrial wastes, Legal aspects, Mining, Chemical wastes, Mineral industry, Water pollution sources, Water pollution effects, Water quality, Safety, Federal Water Pollution Control Act, Common law, Economic aspects, Remedies.
Identifiers: Nuisance(Legal aspects), Injunctive relief, Hazardous substances(Pollution).

Plaintiffs sought an injunction against defendant's continuing discharge of taconite tailings into the intrastate and interstate waters of Lake Superior. Defendant operated a taconite mining and processing plant on the shore of Lake Superior, and discharged 67,000 short tons of suspended solids into Lake Superior daily. These solids included amosite asbestos, a known human carcinogen. Plaintiffs contended that the amosite asbestos detected in the drinking water and air of surrounding communities was traceable to defendant's discharges, and that the discharges constituted a common law nuisance and a violation of the Federal Water Pollution Control Act. Defendant denied these allegations and contended that it has no alternative means of disposal of the tailings, and that an injunction of its operation would have severe adverse consequences on the economy of the area. The District Court held that the discharges violated the Federal Water Pollution Control Act and constituted a common law nuisance, and that in view of the demonstrated threat to the public health and defendant's intransigent refusal to dispose of the failings by safer alternative means, an injunction of further discharges was justified. On appeal to the 8th Circuit, the injunction was stayed and the cause remanded. (Sperling-Florida)
W75-07761

SCENIC HUDSON PRESERVATION CONFERENCE V. CALLAWAY (SUIT BY CONSERVATIONISTS TO ENJOIN HYDRO-ELECTRIC PLANT CONSTRUCTION).
For primary bibliographic entry see Field 6E.
W75-07762

CABIN CREEK, AN ACCUMULATION OF UNPAID SOCIAL AND ENVIRONMENTAL COSTS IN APPALACHIA,
Army Engineer District, Huntington, W. Va.
R. G. Baumgardner, and D. E. Steiner.
Water Spectrum, Vol 6, No 2, p 32-38 (1974). 7 photo, 3 map.

Descriptors: *Acid mine water, *Mine wastes, *Water quality control, *Water pollution sources, *West Virginia, Navigable waters, Water conservation, Environmental sanitation, Reclamation, Planning, Data collections, Ohio River, Reservoirs, Flood damage, Flood protection, Wastes, Treatment facilities, Environmental effects, Legislation, Water law, Safety.
Identifiers: *Watershed protection, Flood plain management.

Cabin Creek is a watershed in West Virginia which presents vistas of deep-mine refuse and strip mined coal fields. Section 223 of the Flood Control Act of 1970 authorized the Army Corps of Engineers to review the effects of strip mining operations upon navigable waters and their tributaries and recommend appropriate measures to alleviate the adverse conditions found. Congress asked for a pilot demonstration of a reclamation project that might be undertaken by the Corps. The Corps selected the Huntington District of the Ohio River Division for the assignment. The Huntington Division recommended the drainage basin of Cabin Creek in the Appalachian region as a representative problem area suffering from strip mining effects. The study group found that reservoir storage, flood plain management, and channel rehabilitation afforded opportunities for flood damage prevention. It proposed, among other al-

ternatives, an attack on water quality problems which could include waste collection and treatment systems coupled with eliminating acid mine drainage problems at their source. Six basic categories of projects and measures for rehabilitation are outlined. Finally, the benefits which could be achieved by implementing these projects are discussed. (Sperling-Florida)
W75-07767

WATER QUALITY-BASED EFFLUENT LIMITATIONS.
Pollution Control Guide, Vol 1, paragraph 601-623, p 601-606, 1973. 6 p.

Descriptors: *Standards, *Water quality, *Federal Water Pollution Control Act, *Effluents, Public health, Technology, Fish, Shellfish, Wildlife conservation, Legislation, Water quality control, Water treatment, Waste water disposal, Pollutants, Water law, State governments.
Identifiers: *FWPCA Amendments of 1972.

Water quality standards are the quantitative embodiment of the goals of the 1972 Amendments to the Federal Water Pollution Control Act. They specify the physical, chemical and biological characteristics of water necessary to protect the public health and welfare and provide for the propagation of fish, shellfish, and wildlife. Experience with other legislation has shown that water quality standards form a cumbersome basis for pollution control, due to the difficulty in establishing a direct relationship between the quantity and quality of pollutant discharges and the resulting quality of the receiving water. The 1972 Act, however, requires that the relationship between discharges and water quality be explicitly established where possible. Complementing the water quality standards program is an independent system of effluent limitations that will be applied without reference to the quality of the receiving water. Even though water quality standards are not the sole basis of the program, they still play an important role in the overall process. Each state is required to develop a water quality management program each portion of which must be reviewed and approved by the Environmental Protection Agency. (Sperling-Florida)
W75-07769

DISCHARGE LIMITATIONS--FEDERAL FACILITIES.
Pollution Control Guide, Vol 1, paragraph 950-592, p 916-921, 1973.

Descriptors: *Discharge(Water), *Federal project policy, *Water pollution control, *Water pollution treatment, *Regulation, Waste water(Pollution), Federal government, Jurisdiction, Federal jurisdiction, Control, Water quality standards, Water quality control, Water law, Federal Water Pollution Control Act, Water Quality Act, Effluents, Water pollution sources, Administrative agencies, Law enforcement, Legal aspects, Administration, Inter-agency cooperation, Governmental interrelations, Project planning, Permits, Reservoir storage.
Identifiers: *National Pollutant Discharge Elimination System, FWPCA Amendments of 1972, Administrative regulations, Effluent limitations, Licenses, Certification.

Summarized are the policies of the Environmental Protection Agency (EPA) pertaining to discharge limitations applicable to federal facilities and guidelines for planning storage reservoirs. Every discharger under the jurisdiction of any federal agency must comply with federal, state, interstate, and local pollution control requirements, including the payment of reasonable service charges. The President may, subject to certain limitations, exempt any agency of the executive branch for a period not to exceed one year. Only the EPA is authorized to issue National Pollutant Discharge Elimination System (NPDES) permits to federal dischargers and no state agency is authorized to enter, inspect or monitor a federal facility. Federal dischargers are also exempt from the requirement that all EPA NPDES permit applicants obtain state certification of compliance with applicable limitations and standards. The storage reservoir planning guidelines reflect the EPA policy prohibiting the use of water storage reservoirs as substitutes for adequate waste treatment or other methods for controlling waste at the source. The guidelines applicable to federal projects cover the following areas: adequate treatment or control at the source; the need for storage for water quality control; environmental assessment; assessment of the value of water quality control storage; identification of beneficiaries; and assessment of other benefits. (Deckert-Florida)
W75-07770

WATER REGULATIONS--WATER QUALITY STANDARDS.
Pollution Control Guide, Vol 2, paragraph 8800-8810, p 9241-9249, 1973.

Descriptors: *Water quality, *Water quality standards, *Regulation, *Legislation, *Federal Water Pollution Control Act, United States, Governments, Water pollution, Water law, Public rights, Water policy.

Part 120--Water Quality Standards identifies and describes state adopted water quality standards which the Administrator of the Environmental Protection Agency has determined meet the criteria of the Federal Water Pollution Control Act. Water quality standards consist of water quality criteria and plans for the enforcement and implementation of such criteria. State-adopted water quality standards which are approved by the Administrator are available for inspection at the Regional Offices of the Environmental Protection Agency and at its Washington, D.C. address. (Proctor-Florida)
W75-07771

WATER REGULATIONS--STATE PROGRAM ELEMENTS NECESSARY FOR PARTICIPATION IN THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM,
Pollution Control Guide, Vol 2, paragraph 8890-8903, p 9311-9331, 1974.

Descriptors: *Federal Water Pollution Control Act, *Water pollution sources, *Discharge(Water), United States, Waste disposal, Water quality control, Waste identification, Permits, Waste treatment, Sewage effluents, Oceans, Bodies of water.
Identifiers: *Waste discharge, *Vessels.

Part 124, State Program Elements necessary for participation in the National Pollutant Discharge Elimination System (NPDES) establishes guidelines specifying procedural and other elements which must be present in a state or interstate program in order to obtain NPDES permits for specific pollutant discharges. Activities excluded from the provisions are set forth. Public notice of every complete application for an NPDES permit will be circulated in a manner designed to inform interested persons of the proposed discharge and appropriate governmental agencies will be notified to provide opportunity to submit their written views and recommendations. Public hearings will be held with reference to specific applications. Once authorized by permits, discharges will be monitored periodically to insure compliance with the conditions of the permit. Any state or interstate agency participating in the program has the capability for the enforcement of the permit requirements. (Proctor-Florida)
W75-07772

WATER REGULATIONS--NPDES,
Pollution Control Guide, Vol 2, paragraph 8910-8936, p 9351-9371, 1973.

Descriptors: *Water pollution, *Water pollution sources, *Permits, *Federal Water Pollution Control Act, *Discharge(Water), Navigable waters, United States, Waste disposal, Water quality control, Waste identification, Waste treatment, Sewage effluents, Oceans, Bodies of water.
Identifiers: *Waste discharge.

Part 125, National Pollutant Discharge Elimination System prescribes the policy and procedures to be followed in connection with applications for federally issued permits authorizing discharges into navigable waters, waters of the contiguous zone, and the oceans. Exceptions to the applicability of the provisions are noted. All discharges of pollutants from all point sources into navigable waters, the waters of the contiguous zone or ocean are unlawful unless the discharger has a permit or is specifically exempted by law or regulation. Average and maximum daily quantitative limitations for the level of pollutants will be specified. Public notice of every complete application for a permit will be given, as well as an opportunity for public hearing before grant or denial of a permit application. (Proctor-Florida)
W75-07773

WATER REGULATIONS--PREPARATION OF WATER QUALITY MANAGEMENT BASIN PLANS,
Pollution Control Guide, Vol 2, paragraph 8987-8991, p 9401-9408, 1974. 8 p.

Descriptors: *Basins, *Water quality control, *Comprehensive planning, *State governments, *Federal government, Future planning(Projected), Watersheds(Basins), Planning, Water resources development, Water pollution control, Long-term planning, Administration, Coordination, Governmental interrelations, Administrative agencies, Inter-agency, Cooperation, Water quality standards, Water Quality Act, Federal Water Pollution Control Act, Water law, Regional development, Hydrologic systems.
Identifiers: Administrative regulations, *National Pollutant Discharge Elimination System, Environmental policy, Effluent limitations, FWPCA Amendments of 1972.

Presented are regulations established by the Environmental Protection Agency pursuant to section 303 (e) of the Federal Water Pollution Control Act, as amended in 1972. These regulations specify procedural and other requirements for the preparation of basin plans pursuant to state continuing planning processes approved in accordance with section 303 (e) of the Act. A basin plan is a management document which identifies the water quality problems of a particular basin and sets forth an effective remedial program. The plan should be designed to provide for orderly water quality management by identifying problems, assessing needs and priorities, scheduling actions to be taken, and coordinating planning. Included are regulations pertaining to the scope and purpose of basin planning, preparation for basin planning, basin plan methodology and contents, monitoring and surveillance, completion and review of basin plans, and the relation of basin plans to certain grants and permits. (Deckert-Florida)
W75-07774

WATER REGULATIONS--CRITERIA FOR THE EVALUATION OF PERMIT APPLICATIONS,
Pollution Control Guide, Vol 2, paragraph 9138-9165, p 9551-9557, 1973.

Descriptors: *Water pollution, *Water pollution sources, *Water quality control, *Water management, Sewage treatment, Water law, Pollutant identification, Data collections, Path of pollutants, Toxins, Water quality, Pollution abatement, Regulation.

Criteria are presented for the evaluation of permit applications for the dumping or discharge of materials in quantities which would adversely affect human or marine health into ocean waters. Application for permits should be evaluated on the basis of the impact of the materials on the marine environment and marine ecosystems. The disposal of some types of waste materials is strictly regulated to minimize known or potential adverse effects on the aquatic environment. Regulation of containerized wastes, materials containing living organisms, solid wastes, and disposal of dredged material is described. Material which is determined to be unpolluted may be dumped at approved sites. Test procedures for determining the nature and quantity of pollutants are revised as applicable knowledge develops. In order to limit possible concentrations of pollutants in specific areas, release and mixing zones have been developed. (Proctor-Florida)
W75-07776

GROUND-WATER PROTECTION IN PENNSYLVANIA, A MODEL STATE PROGRAM,
Geraghty and Miller, Port Washington, N.Y.
For primary bibliographic entry see Field 4B.
W75-07777

ENVIRONMENTAL CONCERN AND POLITICAL ELITES: A STUDY OF PERCEPTIONS BACKGROUNDS AND ATTITUDES,
California Univ., Davis. Inst. of Governmental Affairs.
For primary bibliographic entry see Field 6G.
W75-07779

RESEARCH DEMONSTRATION PILOT STUDY OF MUNICIPAL WASTE COMPOSTING (FINAL ENVIRONMENTAL STATEMENT),
Agricultural Research Service, Washington, D.C.
For primary bibliographic entry see Field 5D.
W75-07786

REJECTION OF TRACE METALS FROM COAL DURING BENEFICIATION BY AGGLOMERATION,
National Research Council of Canada, Ottawa (Ontario). Div. of Chemistry.
For primary bibliographic entry see Field 5A.
W75-07795

RENOVATION OF WASTES BY MINE TAILINGS PONDS,
Idaho Univ., Moscow.
For primary bibliographic entry see Field 5B.
W75-07800

SEPARATOR FOR LIQUIDS OF DIFFERENT DENSITIES,
For primary bibliographic entry see Field 5D.
W75-07805

OIL BOOM,
Shell Oil Co., Houston, Tex. (assignee).
R. R. Ayers.
U.S. Patent No. 3,859,797, 3 p, 1 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 930, No 2, p 623, January 14, 1974.

Descriptors: *Patents, *Oil spills, *Oil pollution, *Pollution abatement, Water pollution control, *Separation techniques, Equipment, Flotsam.
Identifiers: *Oil booms.

A boom for deployment on a water surface comprises: an upright corrugated skirt with the axes of corrugations running from top to bottom of the skirt; support for the skirt having at least one pair of V-shaped outriggers having floats attached to its extremities and inverted over the upper edge of the skirt and attached to it; tandem cables for carrying boom tension attached near the water line on opposite sides of the skirt; and baffles spaced in front of the skirt. (Sinha-OEIS)
W75-07807

LAKE RAKING APPARATUS,
U.S. Patent No. 3,863,237, 3 p, 3 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 930, No 4, p 1977, January 28, 1975.

Descriptors: *Patents, *Pollution abatement, *Water pollution control, *Water quality control, Ponds, *Lakes, Equipment, Dredging.
Identifiers: Debris.

A hand operated apparatus removes stones, weeds, debris and the like from the bottom of ponds and lakes. The apparatus is comprised of a rigid foraminious box-like structure having one open side and a handle attached to one edge of the open side and a rigid cutting edge attached to the edge of the open side opposite the handle. In operation the take is grasped by the cross bar and open end of the rigid receptable, pulled across the area of lake bottom to be cleaned with the cutting edge in contact with the lake bottom. The debris present will be urged up into the receptacle and retained therein. (Sinha-OEIS)
W75-07809

SKIMMING BLADE,
FMC Corp., Chicago, Ill. (assignee)
For primary bibliographic entry see Field 5D.
W75-07812

APPARATUS FOR TAKING FLOATING AND SOLID MATERIALS OUT OF CHANNELS,
G. Abel.
U.S. Patent No. 3,872,006, 4 p, 5 fig, 9 ref; Official Gazette of the United States Patent Office, Vol 932, No 3, p 1077, March 18, 1975.

Descriptors: *Patents, *Flotsam, *Water pollution control, Water quality control, *Pollution abatement, Equipment, *Separation techniques, Solid wastes.

An apparatus is described for taking floating and solid materials out of channels, especially channels of clarification plants. The apparatus includes an inclined grate that is transmissible for liquids and extends to the bottom of a channel, the grate changing over into a conveyor chute leading to a discharge outlet. Driven elevator chains are provided with blades passing along the inclined conveyor chute and adjoining grate to remove floating and solid materials from the channel in which the grate is positioned. These elevator chains are guided by lower and upper sprockets, the lower sprockets being mounted in independent suspension on side walls pivotally arranged about the axis of the upper sprockets thereby providing the blades with better mobility. The apparatus may also be used in the textile or leather manufacturing industries for removing fibers and fiber-like materials from liquids. (Sinha-OEIS)
W75-07814

THE FEASIBILITY OF PENAEID SHRIMP CULTURE IN BRACKISH PONDS RECEIVING TREATED SEWAGE EFFLUENT,
North Carolina State Univ., Raleigh. Sea Grant Program.
For primary bibliographic entry see Field 3C.
W75-07830

6. WATER RESOURCES PLANNING

6A. Techniques Of Planning

THE INTERRELATIONSHIP OF ECONOMIC DEVELOPMENT AND ENVIRONMENTAL QUALITY IN THE UPPER COLORADO RIVER BASIN: AN INTERINDUSTRY ANALYSIS,
Colorado Univ., Boulder. Dept. of Economics.
For primary bibliographic entry see Field 6B.
W75-07377

WATER SUPPLY AND WASTEWATER DISPOSAL IN RURAL AREAS OF INDIA,
Greenleaf/Telesca, Miami, Fla. Environmental Sciences Dept.
For primary bibliographic entry see Field 4A.
W75-07381

A GENERAL LINEAR APPROACH TO STREAM WATER QUALITY MODELING,
IBM Federal Systems Div., Gaithersburg, Md.
For primary bibliographic entry see Field 5B.
W75-07382

LINEAR DECISION RULE IN RESERVOIR MANAGEMENT AND DESIGN, 4. A RULE THAT MINIMIZES OUTPUT VARIANCE,
Johns Hopkins Univ., Baltimore, Md. Dept. of Geography and Environmental Engineering.
For primary bibliographic entry see Field 4A.
W75-07383

LINEAR DECISION RULE IN RESERVOIR MANAGEMENT AND DESIGN, 5. A GENERAL ALGORITHM,
Johns Hopkins Univ., Baltimore, Md. Dept. of Geography and Environmental Engineering.
For primary bibliographic entry see Field 4A.
W75-07384

A REVIEW AND EVALUATION OF MULTIOBJECTIVE PROGRAMMING TECHNIQUES,
Johns Hopkins Univ., Baltimore, Md. Dept. of Geography and Environmental Engineering.
J. L. Cohon, and D. H. Marks.
Water Resources Research, Vol 11, No 2, p 208-220, April 1975. 5 fig, 5 tab, 51 equ, 48 ref.

Descriptors: *Water resources, *Planning, *Evaluation, Decision making, Constraints, Optimization, Systems analysis, Mathematical models, *Reviews.
Identifiers: *Multiobjective programming techniques, Vector optimization, Trade-offs.

The recent proliferation of methods for solving vector optimization problems has left little time for considering some highly important issues related to the multiobjective analysis of public investment alternatives. Presented is a discussion of these issues and an evaluation of the utility of multiobjective programming techniques for water resource planning. Three criteria are established for such evaluation: (1) computational efficiency; (2) explicitness of trade-offs among objectives; and (3) the amount of information generated for decision making. The multiobjective approaches are classified, and the methods in the various classes are reviewed and evaluated in terms of the hypothesized criteria. The classes, and their methods considered, are: (1) generating techniques, including weighting and constraint methods; (2) techniques which rely on prior articulation of preferences: noninterative methods, including goal programming, utility functions and optimal weights, the electre method, and the surrogate worth trade-off method; and (3) techniques which rely on progressive articulation of

preferences, including the step method. The evaluations are then used in establishing conclusions about the applicability of the multiobjective approaches to water resource problems. (Bell-Cornell)
W75-07385

WATER QUALITY MODELING BY MONTE CARLO SIMULATION,
Maine Univ., Orono. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W75-07386

DECISION ANALYSIS FOR THE RIVER WALK EXPANSION IN SAN ANTONIO, TEXAS,
Texas Univ., San Antonio. Dept. of Environmental Studies.
For primary bibliographic entry see Field 6B.
W75-07387

A SCREENING MODEL FOR WATER RESOURCES PLANNING,
Nebraska Univ., Lincoln. Water Resources Research Inst.
W. Viessman, Jr., G. L. Lewis, I. Yomtovian, and N. J. Viessman.
Water Resources Bulletin, Vol 11, No 2, p 245-255, April 1975. 2 fig, 3 tab, 3 ref.

Descriptors: Water resources, *Planning, *Linear programming, *Economic efficiency, *Simulation analysis, *Flood control, Optimization, Regional development, Management, Streamflow, Costs, Benefits, Flood damage, Alternative planning, Surface waters, Water utilization, Reservoir storage, Recreation, Constraints, Evaluation, Hydrologic aspects, Mathematical models, Systems analysis, *Nebraska.
Identifiers: *Screening models, *Elkhorn River basin(Neb), Cost minimization, Benefit maximization.

Optimization and simulation are combined in a procedure to select the most efficient arrangement of components for regional water resources development and management policy. The technique is applied to the Elkhorn River basin in Nebraska, which extends over 7,000 square miles and includes 184 proposed reservoirs. Structure sizes, locations and operating policies are selected for optimal plans based on economic efficiency and regional development. Model input consists of an historical or simulated sequence of unregulated annual and within-year period streamflows at each water use or management site. The proposed model is intended as a preliminary screening tool; it is easy to apply, has minimal data requirements, and has a sound physical base. Use of the model, which utilizes linear programming, in decision making for flood control is considered in detail. Objectives employed in evaluating alternatives include both net annual benefit maximization and annual cost minimization. Results indicate that substantial savings in time and costs over conventional planning techniques are effected. Agreement between model output and agency design values was noted.
W75-07388

STOCHASTIC WATER QUALITY CONTROL BY SIMULATION,
Texas Univ., San Antonio. Div. of Environmental Studies.
For primary bibliographic entry see Field 5B.
W75-07389

DYNAMIC PROGRAMMING FOR OPTIMAL CAPACITY EXPANSION OF WASTEWATER TREATMENT PLANTS,
Case Western Reserve Univ., Cleveland, Ohio. Systems Engineering Div.
For primary bibliographic entry see Field 5D.
W75-07390

MATHEMATICAL MODELLING OF WATER RESOURCES SYSTEMS,
Israel Inst. of Tech., Haifa.
N. Buras.
Hydrological Sciences Bulletin, Vol 19, No 4, p 393-400, December 1974. 80 ref.

Descriptors: *Water resources, *Planning, *Mathematical models, Computers, *Operations research, Dynamic programming, Linear programming, Environmental effects, Cost-benefit analysis, Regional development, *Model studies.
Identifiers: *Systems engineering, Systems synthesis, Trade-offs.

Mathematical models are becoming increasingly important in water resources systems engineering. Systems engineering can be viewed as a sequence of steps which lead from the formulation of the problem, to the design of the various components, to their construction, and finally to their operation. Computers facilitate and expedite analysis at almost any level of accuracy. However, the limitations of the available computer capability often determine that level. The application of mathematical models to the central problem in water resources enables a more incisive insight into the nature of the problem. The use of mathematical models, however, depends heavily on the amount and quality of the data available because the results of analysis are only as good as the data used and the assumptions underlying the mathematical models. There are two broad areas in mathematical modelling of water resources systems which now receive increased attention. One area, in which the emphasis is in natural sciences, has to do with environment impacts of those systems. The other area, where social sciences carry more weight, is that of relating the economy to demand for and benefits from water and water derived outputs. (Singh-ISWS)
W75-07438

HYDROLOGIC IMPACT OF WATER MODIFICATION,
Agricultural Research Service, Chickasha, Okla.
For primary bibliographic entry see Field 3B.
W75-07505

COMPUTER SIMULATION OF LAND USE DYNAMICS,
Oregon State Univ., Corvallis. Willamette Simulation Unit.
C. C. Calligan.
In: Land and Water Use in Oregon; Seminar conducted by Oregon State University, Spring Quarter 1974, Water Resources Research Institute, Corvallis, Oregon, p 9-25, July 1974. 9 fig, 6 ref.

Descriptors: *Computer models, *Land use, *Model studies, *Oregon, Urbanization, Mathematical models, Land management, Land classification, Land resources, Forests, Agriculture, Cities, Industries, Valleys.
Identifiers: *Willamette Valley(Ore).

The land use model described is one component of the larger Willamette Simulation Model. Various inputs into the model describe policy variables whose values the policy maker (the model user) can directly influence and scenario variables that can be changed frequently in order to create different 'what if' scenarios such as interest rates. Data variables are fixed inputs whose values are determined initially by the modeler, but which can be changed if better data becomes available. Dynamic inputs are variables that come from other components of the model; their values are updated at each time step (e.g., demand for industrial land from the economic component). Dynamic outputs are variables that are calculated at each time step in the land use component; some are information outputs only and some feed back to other components as inputs (e.g., speculative land value to the economic component). The use of the model was illustrated by a discussion of its use in predicting the demand for residential land and land market speculation. The model helped to identify the key variables and to determine how they are interconnected. It also can help to find elusive 'critical points of intervention.' (See also W75-07507) (Sims-ISWS)
W75-07509

ENVIRONMENTAL CARRYING CAPACITY: AN INTEGRATIVE MANAGEMENT CONCEPT,
Environmental Protection Agency, Washington, D.C. Office of Research and Development.
P. W. House.
In: Environmental Management in the Colorado River Basin, October 15-16, 1973, Salt Lake City, Utah, Utah State University Press, Logan, 1974, p 37-58. 4 fig.

Descriptors: *Model studies, *Colorado River Basin, *Computer models, *Long-term planning, *Environmental effects, *Land use, Arizona, New Mexico, Utah, Colorado, Wyoming, Nevada, California, Regional analysis, Resource allocation.
Identifiers: Environmental management.

A State of the System Model can be designed to measure and evaluate a region's resources. Such a model can be used to test a region's current allocation of resources or a comprehensive plan for the future. Feasibility of a proposal is demonstrated if the desired growth can be achieved without violating any of the side conditions initially built into the model, such as development of industry without exceeding a predetermined maximum permissible pollution level. The State of the System Model has four basic components: (1) Sectors of growth; (2) Production component output; (3) Limitations and constraints; and (4) Long term goals of society. Since the model has many adjustment loops, it is particularly adept at incorporating the variables of a region. Thus, the model addresses questions such as whether or not a region has the capability of arriving at desired goals given the existing problems and the area-specific adjustment processes. (See also W75-07525) (Bowden-Arizona)
W75-07529

CONCEPTS OF CARRYING CAPACITY AND PLANNING IN COMPLEX ECOLOGICAL SYSTEMS,
Colorado State Univ., Fort Collins. Dept. of Sociology and Anthropology.
D. M. Freeman, and P. J. Brown.
In: Environmental Management in the Colorado River Basin, October 15-16, 1973, Salt Lake City, Utah, Utah State University Press, Logan, 1974, p 281-297, 17 ref.

Descriptors: *Colorado River Basin, *Planning, *Decision making, *Regional development, *Carrying capacity, Arizona, Utah, Colorado, New Mexico, Wyoming, California, Nevada, Alternative planning.
Identifiers: Environmental management.

The concept of carrying capacity is examined for its utility in analyzing resource allocation problems in ecosystems as complex as the Colorado River Basin. The key to solving a problem is to formulate it usefully. Carrying capacity is too limited a concept to be useful, i.e., it sets limits of numbers but fails to clarify distribution. Planning should focus instead on alternative futures. Actions taken should be at the lowest possible cost in resources and the highest possible number of options should be kept open for the future. The social sciences can help fabricate learning systems for planning decisions. Benefits could be: (1) to allow for decentralized decision making with the discipline of preserving and expanding the contexts of choice; (2) to allow flexibility in decision making with a defense against all decisions that foreclose future options. (See also W75-07525) (Bowden-Arizona)
W75-07544

PUERTO RICO WATER RESOURCES PLANNING MODEL STUDY,
Geological Survey, Reston, Va.
D. W. Moody, E. D. Attanasi, E. R. Close, T. Maddock, III, and M. A. Lopez.
Open-file report, July 1973. 114 p, 10 fig, 8 tab, 77 ref.

Descriptors: *Model studies, *Planning, *Systems analysis, *Puerto Rico, *Water resources development, *Data collections, Basic data collections, Water demand, Water supply, Economics, Costs, Mathematical models.

The Puerto Rico Water Resources Planning Model Study, in addition to developing analytical tools for Commonwealth planners, was designed to provide an opportunity to evaluate the adequacy of data collection programs in terms of water resources development, and some of the water problems facing Commonwealth planners are reviewed. Some of the systems analysis techniques available to water resources planners and planning models proposed for use in Puerto Rico, are described. The availability of data used in the planning models and the steps required to implement the techniques are summarized. (Knapp-USGS)
W75-07568

A SPECIAL PLANNING TECHNIQUE FOR STREAM-AQUIFER SYSTEMS,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 2A.
W75-07584

MONTEREY COUNTY MASTER DRAINAGE PLAN, SANTA RITA CREEK WATERSHED.
Monterey County Surveyors, Inc., Salinas, Calif; and McCreary-Koretsky-International, Salinas, Calif.
For primary bibliographic entry see Field 4A.
W75-07661

MONTEREY COUNTY MASTER DRAINAGE PLAN EL TORO CREEK WATERSHED.
Monterey County Surveyors, Inc., Salinas, Calif.; and Koretsky King Associates, Inc., Salinas, Calif.
For primary bibliographic entry see Field 4A.
W75-07662

MONTEREY COUNTY MASTER DRAINAGE PLAN, CARMEL VALLEY WATERSHEDS.
Monterey County Surveyors, Inc., Salinas, Calif; and Koretsky King Associates, Inc., Salinas, Calif.
For primary bibliographic entry see Field 4A.
W75-07663

WATER QUALITY CONTROL PLAN: SAN FRANCISCO BAY BASIN, CALIFORNIA,
Water Resources Engineers, Inc., Walnut Creek, Calif; and Yoder, Trotter, Orlob and Associates, Walnut Creek, Calif.
For primary bibliographic entry see Field 5G.
W75-07673

SYSTEM IDENTIFICATION AND MULTI-LEVEL OPTIMIZATION OF INTEGRATED GROUND WATER SYSTEMS,
California Univ., Los Angeles. Dept. of Engineering Systems.
For primary bibliographic entry see Field 2F.
W75-07722

6B. Evaluation Process

ECONOMIC IMPLICATION OF PUBLIC WATER POLICY IN ARIZONA,
Arizona Univ., Tucson. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 6E.
W75-07351

METHODS OF COMMUNICATING ACTIVITIES IN POLLUTION ABATEMENT BY FIVE HUNDRED MAJOR INDUSTRIAL CORPORATIONS IN THE UNITED STATES,
Texas A and M Univ., College Station. Environmental Quality Program.
For primary bibliographic entry see Field 5G.
W75-07359

WATER SUPPLY IN CENTRAL AND SOUTHERN APACHE COUNTY,
Arizona Water Commission, Phoenix.
For primary bibliographic entry see Field 4B.
W75-07370

TEXAS WATERBORNE COMMERCE COMMODITY FLOW STATISTICS,
Texas Transportation Inst., College Station.
J. T. Lamkin, and W. R. Lowery.
Available from the National Technical Information Service, Springfield, Va 22161 as COM-74-10083, $5.25 in paper copy, $2.25 in microfiche. TAMU-SG-73-207, June 1973. 115 p, 17 fig, 89 tab, 3 append. NOAA 04-30-158-18.

Descriptors: *Texas, *Inland waterways, *Transportation, *Harbors, Economic impact, Coasts, Employment, Import, Export.
Identifiers: *Waterborne commerce.

Information compiled on tonnage reflects commodity movements at Texas ports and waterways in 1965 and 1970 and highlights the role of waterborne commerce to the Texas economy. Total tonnage moving in foreign trade increased by 4 million tons in 1970 over 1965 while domestic coastwise traffic declined by a corresponding amount during the same period. Intracoastal waterway traffic increased by almost 8 million tons. However, despite this absolute increase in Texas' share of foreign tonnage, domestic coastwide and internal tonnage declined in relation to the rest of the Nation. Several of the major ports in the State have serious traffic imbalances. The data illustrates the close connection between most ports and waterways in the state and the petroleum and chemical industries. Texas ports and waterways were utilized by the State's industries to ship and receive over 190 million tons of goods in 1970, representing 12.6% of total activity at all U.S. ports in that year. Domestic movements represent 78.8% of the Texas total while coastwise and inland water traffic represents 32.8% and 15.0% respectively, of the U.S. total in these categories. Major commodities making up the flow are identified. The loss of 4 million tons in coastwide trade is of special concern to the State. (Auen-Wisconsin)
W75-07376

THE INTERRELATIONSHIP OF ECONOMIC DEVELOPMENT AND ENVIRONMENTAL QUALITY IN THE UPPER COLORADO RIVER BASIN: AN INTERINDUSTRY ANALYSIS,
Colorado Univ., Boulder. Dept. of Economics.
B. Udis, C. W. Howe, and J. F. Kreider.
Available from the National Technical Information Service, Springfield, Va 22161 as COM-73-11970, $15.25 in paper copy, $2.25 in microfiche. Report No. EDA-OER-73-122, July 1973. 651 p, 55 fig, 190 tab, 102 ref. OER-351-G-71-8.

Descriptors: *Computer programs, *Computer models, *Regional economics, *Environmental effects, *Air pollution, *Hydrologic systems, *Colorado River Basin, *River basin development, Input-output analysis, Water supply, Water quality, Salinity, Economic impact, Water management(Applied), Forestry, Agriculture, Recreation, Mining, Electric power, Oil shales, Water pollution, Industrial production.
Identifiers: *Air diffusion models, *Hydrologic-salinity models, Colorado River sub-basin, Green River sub-basin, San Juan River sub-basin, Fortran.

To permit planners to test some of the environmental implications of alternative growth patterns for the three sub-basins of the Upper Colorado River, a set of compatible models relating economic activities, present and prospective, to air quality and water quality and quantity resulting from economic patterns of activity were developed. The Upper Main Stem, the Green and the San Juan sub-basins contain great potential for further recreational and industrial development, and therefore provide an opportunity to identify the results of inconsistent planning. Each sub-basin model contains three major components: (1) an economic input-output model supplemented by coefficients of air- and waterborne waste residuals for each industry; (2) an air diffusion model; and (3) a hydrologic-salinity model to trace monthly surface and groundwater and salt flows through the system. Although originally the feasibility of water and air quality models for such large and complex regions was questionable, results have been encouraging. It is anticipated that similar models will be applied to analyze major environmental impacts of such critical developments as increasing agricultural water uses, development of a major shale oil industry, and continued diversions of water from the Upper Main Stem sub-basin to the eastern slope of the Rocky Mountains. (Becker-Wisconsin)
W75-07377

JAPAN: A SURVEY OF PORTS, DEEP WATER TERMINALS, AND VESSELS,
Army Engineer District, San Francisco, Calif. Economics Branch.
For primary bibliographic entry see Field 6C.
W75-07379

SOUTHWEST ENERGY STUDY. SUMMARY REPORT.
Southwest Energy Federal Task Force.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-232 096, $8.75 in paper copy, $2.25 in microfiche. November 1972. 253 p, 28 fig, 25 tab.

Descriptors: *Energy, *Fossil fuels, *Colorado River Basin, *Southwest U.S., *Environmental effects, Coal mines, Economic impact, Electric power production, Electric power demand, Strip mine wastes, Energy conversion, Indian reservations, Public lands, Electric powerplants, Social impact, Air pollution, Strip mines, Land reclamation, Transmission lines, Transportation, Natural resources, Water supply, Future planning(Projected), Spoil banks, Leases, Pipelines.
Identifiers: *Coal reserves, *Coal-fired electric power.

Based on observations and inspections by the Southwest Energy Study team, the information presented in work group reports, information furnished by contributors to the study, and comments received on the April 1972 draft of the report on the Southwest Energy Study, conclusions were evolved concerning existing and proposed coal-fired steam-electric generating plants in the Southwestern United States. Also examined were projected needs for electric energy, alternative means for supplying it, and the resulting environmental effects. Four different energy production levels (Phases I-IV) were assumed in order to represent horizons against which to judge impacts and needed controls on the use of Colorado River

Basin coal. The study findings are grouped under six categories: (1) Energy Need and Supply, (2) Resources Available, (3) Impacts, (4) Mitigation of Impacts, (5) Alternatives, and (6) Information Needs. Sufficient coal and water exist within the area to meet the need for 30,000 mw of coal-fired steam-electric energy. This power generation is predicted, according to diffusion model analysis, to create sulphur dioxide concentrations exceeding short-term national air quality standards in the vicinity of all plants included in Phase I, the lowest level of energy production. Significant information shortages exist in many important areas of the study. (Becker-Wisconsin)
W75-07380

A REVIEW AND EVALUATION OF MULTIOBJECTIVE PROGRAMMING TECHNIQUES,
Johns Hopkins Univ., Baltimore, Md. Dept. of Geography and Environmental Engineering.
For primary bibliographic entry see Field 6A.
W75-07385

DECISION ANALYSIS FOR THE RIVER WALK EXPANSION IN SAN ANTONIO, TEXAS,
Texas Univ., San Antonio. Dept. of Environmental Studies.
J. H. Dean, and C. S. Shih.
Water Resources Bulletin, Vol 11, No 2, p 237-244, April 1975. 3 fig, 2 equ, 3 ref.

Descriptors: Water resources development, *Decision making, *Intangible benefits, *Methodology, Evaluation, Rivers, Simulation analysis, Monte Carlo methods, Recreation, Tangible benefits, Management, Planning, Systems analysis, Equations, Mathematical models, Reliability, Economics, Assessment, *Texas.
Identifiers: *San Antonio River Walk(Texas), Decision analysis, *Multiattribute utility theory, Alternatives, Sensitivity analysis, Urban areas, Ranking, Optimum choice-making.

The San Antonio River Walk, a unique tourist attraction and urban rejuvenation catalyst, is of great social and economic value to that city. Its success has led to plans for expansion of the present River Walk. It is held that the expansion decision should not be evaluated merely on a benefit-cost ratio. The Water Resources Council has recommended that intangible attributes such as recreational values and social impacts be considered as well as tangible attributes such as cost. This has prompted the application of decision analysis techniques with multiattribute utility ratings. Decision analysis is a systematic solution procedure which can be used to crystallize a complicated decision problem into manageable subproblems by ranking the decision alternatives in accordance with cardinal utility values attached to their consequences. Recent advances in multiattribute utility theory allow a decision maker to weigh utility assessment over tangible and intangible attributes according to their relative importance. This insures that the intangible attributes will receive due consideration in the final decision-making. Moreover, sensitivity analysis embedded with Monte-Carlo simulation can add extra dimensions of reliability to the decision analysis results. (Bell-Cornell)
W75-07387

A SCREENING MODEL FOR WATER RESOURCES PLANNING,
Nebraska Univ., Lincoln. Water Resources Research Inst.
For primary bibliographic entry see Field 6A.
W75-07388

ANALYSIS OF NEW TECHNIQUES FOR PUBLIC INVOLVEMENT IN WATER PLANNING,
Stanford Univ., Calif. Dept. of Civil Engineering.
T. P. Wagner, and L. Ortolano.
Water Resources Bulletin, Vol 11, No 2, p 329-344, April 1975. 40 ref.

Descriptors: *Water resources, *Planning, *Simulation analysis, Computers, Communication, Forecasting, Decision making, Alternative planning, Evaluation, Priorities, Mathematical models, Systems analysis, Washington.
Identifiers: *Public involvement, Gaming, Delphi method, Public brochures, Priority evaluation game, Predicting, Policy, Ranking, Impact, Seattle(Wash), Inland Lakes Project.

Growing demands by the public for a more active role in water planning have recently generated considerable interest among researchers and planners in the subject of public involvement techniques. Numerous surveys have found, however, that standard public participation techniques (e.g., public hearings) by themselves are considered inadequate. Several techniques having potential for overcoming some of the limitations of standard public involvement methods have recently been developed. Several of these new techniques are described and analyzed in terms of their potential utility in water resources planning. Delphi inquiries, KSIM, gaming simulations, the priority evaluation game, computer based communication systems, and public brochures with feedback are examined in terms of ease of implementation, numbers of affected publics who can participate, kinds of results which can be expected in field level planning situations, and the kinds of planning activities with which the techniques can be used. The activities include problem definition, formulation of alternative actions, impact analysis, and the ranking of alternative actions. Of all the new techniques examined, the use of public information brochures with feedback currently has the greatest potential for meaningfully involving publics in field level water planning. (Bell-Cornell)
W75-07391

ISRAEL'S WATER ECONOMY AND ITS PROBLEMS IN THE EARLY SEVENTIES,
Tahal Consulting Engineers Ltd., Tel-Aviv (Israel). Long Range Planning Section.
For primary bibliographic entry see Field 6D.
W75-07402

TEACHING COASTAL ZONE MANAGEMENT: AN INTRODUCTORY COURSE SYLLABUS,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2L.
W75-07411

MATHEMATICAL MODELLING OF WATER RESOURCES SYSTEMS,
Israel Inst. of Tech., Haifa.
For primary bibliographic entry see Field 6A.
W75-07438

LAND AND WATER USE IN OREGON,
Oregon State Univ., Corvallis. Water Resources Research Inst.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-241 709, $5.75 in paper copy, $2.25 in microfiche. Seminar, Spring Quarter 1974, July 1974. 130 p. OWRT A-999-ORE(17).

Descriptors: *Conferences, *Land use, *Water utilization, *Oregon, Model studies, Computer models, Land classification, Economics, Social aspects, Demand, Industries, Urbanization, Flood plains, Flood protection, Flood plain insurance, Water law, Adjudication procedure, Administrative agencies, Legislation, Parks, Natural resources, Recreation, Legal aspects, Waste treatment, Septic tanks, Planning, Public access, Coasts, Groundwater, Aquifer systems, Groundwater basins, Water quality.
Identifiers: Consumer protection, *Willamette River(Ore).

Oregon land and water problems were discussed in a series of 10 weekly seminars. Subjects included: (1) the practical limits of pollution control technology, (2) computer simulation of land use dynamics, (3) evolving patterns of flood plain use, (4) adjudication in landwater disputes, (5) consumer protection and land use, (6) Willamette River parks system, (7) the septic tank's role in land use, (8) constitutional restrictions on coastal land use, (9) Oregon's approach to groundwater investigation, and (10) water quality in eastern Oregon. (See W75-07508 thru W75-07517) (Humphreys-ISWS)
W75-07507

THE PRACTICAL LIMITS OF POLLUTION CONTROL TECHNOLOGY,
Oregon State Univ., Corvallis. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5G.
W75-07508

COMPUTER SIMULATION OF LAND USE DYNAMICS,
Oregon State Univ., Corvallis. Willamette Simulation Unit.
For primary bibliographic entry see Field 6A.
W75-07509

EVOLVING PATTERNS OF FLOOD PLAIN USE,
Oregon State Univ., Corvallis. Dept. of Geography.
For primary bibliographic entry see Field 6F.
W75-07510

ADJUDICATION IN LAND-WATER DISPUTES,
Oregon Div. of State Lands, Salem.
For primary bibliographic entry see Field 6E.
W75-07511

CONSUMER PROTECTION AND LAND USE,
Oregon Real Estate Div., Salem.
H. H. Hargreaves.
In: Land and Water Use in Oregon; Seminar conducted by Oregon State University, Spring Quarter 1974, Water Resources Research Institute, Corvallis, Oregon, p 51-54, July 1974.

Descriptors: *Land use, *Land development, *Zoning, *Legislation, *Oregon, Real property, Regulation, Planning, Social aspects, Legal aspects, Comprehensive planning.
Identifiers: *Real estate agents, *Consumer protection, Real estate, Disclosure statements, Warranties.

The forces for consumer protection and land use planning are in tension with the traditional conduct of the real estate and building businesses. Consumer protection legislation was built into House Bill 2607, which was repealed in the 1974 special legislative session. It required the developer to disclose all relevant information to the consumer about the purchase. This included information about the land, water, sewage, planned improvements or lack of same, schools, fire protection, etc. Confusion about the warranty aspect of full disclosure in House Bill 2607 was a major factor in its repeal. The agent or developer provides service to both seller and purchaser. In order to serve the seller he must know the product as intimately as possible; it is simply not possible to provide adequate representation without knowing the property. The agent or the seller cannot execute a responsible sale unless available information about land use is offered the purchaser. The responsible agent, for instance, thinks in economic and environmental terms and he is probably more informed than planners about personal and social relationships in a given area. Responsible agents can aid the efforts to plan wisely, but to gain their interest, they must be forced into the process it-

self. Disclosure laws can serve to stimulate their involvement. (See also W75-07507) (Sims-ISWS)
W75-07512

WILLAMETTE RIVER PARKS SYSTEM,
Willamette River Parks System, Salem, Oreg.
G. W. Churchill.
In: Land and Water Use in Oregon; Seminar conducted by Oregon State University, Spring Quarter 1974, Water Resources Research Institute, Corvallis, Oregon, p 55-67, July 1974.

Descriptors: *Parks, *Rivers, *River basin development, Recreation facilities, Scenery, Scenic highways, Legislation, Legal aspects, Administrative agencies, Natural resources, Public access, Water policy, Water quality control, Water pollution control, Pulp wastes, Pulp and paper industry, *Oregon.
Identifiers: *Willamette River(Ore).

The history and present status of the Willamette River Parks System was discussed. The system was established by a law passed in 1967. Presently, 69.5 miles of river frontage are owned by the state or by local governments as part of the parks system. The pollution of the river has been reduced, to an important extent by the reduction of paper mill wastes discharged into the river. The effects of recent amendments to the 1967 law were described. Significant amendments were reproduced as part of the paper. (See also W75-07507) (Sims-ISWS)
W75-07513

THE SEPTIC TANK'S ROLE IN LAND USE,
Oregon State Dept. of Environmental Quality, Portland.
For primary bibliographic entry see Field 5D.
W75-07514

CONSTITUTIONAL RESTRICTIONS ON COASTAL LAND USE,
Oregon State Land Conservation and Development Commission, Portland.
For primary bibliographic entry see Field 6E.
W75-07515

OREGON'S APPROACH TO GROUNDWATER INVESTIGATIONS,
Oregon State Engineer's Office, Salem.
For primary bibliographic entry see Field 4B.
W75-07516

WATER QUALITY IN EASTERN OREGON,
Oregon State Univ., Corvallis. Dept. of Soil Science.
For primary bibliographic entry see Field 5B.
W75-07517

ENVIRONMENTAL MANAGEMENT IN THE COLORADO RIVER BASIN.
Proceedings of Conference, October 15-16, 1973, Salt Lake City, Utah, Utah State University Press, Logan, 1974. 313 p. Crawford, A. B., Peterson, D. F., eds.

Descriptors: *Colorado River Basin, *Environmental effects, *Salinity, *Agriculture, *Urbanization, Arizona, New Mexico, Utah, Wyoming, California, Colorado, Nevada, Planning, Recreation, Powerplants, Energy conversion, Transportation, Legislation.

The Colorado River Basin is characterized by aridity and by the limited assimilative capacity of the region's environment. Background for considering environmental management in the basin is provided by surveys of the problems confronting basin-wide planning, and by the use of environmental indices and the concept of carrying capacity in planning. Topics considered individually are recreation, agriculture, energy development, transportation, and urbanization. Also, the international implications of salinity, the future of regional planning in the United States, the prospects for environmental legislation in the United States and future research needs are considered. (See W75-07526 thru W75-07545) (Bowden-Arizona)
W75-07525

MANAGEMENT OBJECTIVES IN THE COLORADO RIVER BASIN: THE PROBLEM OF ESTABLISHING PRIORITIES AND ACHIEVING COORDINATION,
Bureau of Reclamation, Salt Lake City, Utah. Upper Colorado Region.
D. L. Crandall.
In: Environmental Management in the Colorado River Basin, October 15-16, 1973, Salt Lake City, Utah, Utah State University Press, Logan, 1974, p 17-23.

Descriptors: *Coordination, Research priorities, *Priorities, Colorado River, *Colorado River Basin, *Resource allocation, *Water supply, *Water demand, *Arizona, Utah, New Mexico, Colorado, Wyoming, California, Nevada, Urbanization, Agriculture, Energy Conversion, Powerplants, Regional analysis.
Identifiers: *Central Arizona Project(CAP), Environmental management.

Since 1900 the flow of the Colorado River has been thoroughly committed to uses such as hydroelectric power, mining, irrigated agriculture, cities and recreation. Future uses such as coal gasification, coal fired electric plants, the Central Arizona Project, the Navajo Project and various Utah projects will place water requirements beyond the river's current flow and may necessitate restricting Lower Basin uses for the benefit of Upper Basin development. Also, settlement of Indian claims may place a new and heavy demand on the river's flow. Environmental planning has always been a part of past efforts to manage the Colorado. For example, water is released from Lake Powell at times to enhance bass spawning in Lake Mead. The overcommitment of the river's water will make future management and environmental planning more difficult. It will be necessary for priorities to be set by citizens acting through local, state, and federal bodies. (See also W75-07525) (Bowden-Arizona)
W75-07527

THE ROLE OF ENVIRONMENTAL INDICES IN REGIONAL MANAGEMENT,
Resources for the Future, Inc., Washington, D.C.
J. C. Davies, III.
In: Environmental Management in the Colorado River Basin, October 15-16, 1973, Salt Lake City, Utah, Utah State University Press, Logan, 1974, p 24-36. 1 ref.

Descriptors: Environment, *Colorado River Basin, *Long-term planning, *Environmental effects, *Regional analysis, Arizona, New Mexico, Utah, Wyoming, California, Nevada, Colorado.
Identifiers: *Environmental indices, Environmental management.

An index is a quantitative summary of data and relates to a particular purpose or problem. Indices are easier to use than computers and less mystifying to most people. They are particularly helpful in trade-off considerations, and in evaluating a program's performance. However, despite these advantages, environmental indices are not made or used enough. One obstacle to use is limited understanding of the nature of the environment; thus, environmental problems change and evolve. Also, it is not always easy to convert change as measured in an index to values such as good or bad. There are simple data limitations in many environmental areas. And finally, there is a reluctance by some to use indices because indices evaluate their programs. These obstacles must and will be overcome for indices are a useful tool in assessing environmental change. (See also W75-07525) (Bowden-Arizona)
W75-07528

ENVIRONMENTAL CARRYING CAPACITY: AN INTEGRATIVE MANAGEMENT CONCEPT,
Environmental Protection Agency, Washington, D.C. Office of Research and Development.
For primary bibliographic entry see Field 6A.
W75-07529

COLORADO RIVER MANAGEMENT AND INTERNATIONAL LAW,
International Law Association, Mexico City.
For primary bibliographic entry see Field 6E.
W75-07530

THE FUTURE OF REGIONAL PLANNING IN THE UNITED STATES,
Council on Environmental Quality, Washington, D.C.
J. A. Busterud.
In: Environmental Management in the Colorado River Basin, October 15-16, 1973, Salt Lake City, Utah, Utah State University Press, Logan, 1974, p 67-74.

Descriptors: Colorado River, *Colorado River Basin, *Long-term planning, *Regional development, *Water allocation(Policy), Arizona, New Mexico, Utah, Colorado, Wyoming, Nevada, California, Water resources, Water utilization, Regional analysis.
Identifiers: Environmental management.

Regional planning is moving from questions such as 'whether or not' and 'when' to the issues of 'how much' and 'where'. This movement contains some basic trends. Land use regulation, for example, must be concrete and immediate part of politics on the local level if it is to be effective. Also, it is being recognized that public construction such as sewers can either hasten or slow growth. In many respects the water problem of the Colorado River Basin have made it a model of regional planning; seven states and two nations have been forced to find agreement on the allocation of the water. Water shortages now predicted for the future will force this region into yet more stringent planning. (See also W75-07525) (Bowden-Arizona)
W75-07531

CRITERIA FOR THE DETERMINATION OF RECREATIONAL CARRYING CAPACITY IN THE COLORADO RIVER BASIN,
Forest Service (USDA), Missoula, Mont. Northern Forest Fire Lab.
G. H. Stankey.
In: Environmental Management in the Colorado River Basin, October 15-16, 1973, Salt Lake City, Utah, Utah State University Press, Logan, 1974, p 82-101, 1 tab, 36 ref.

Descriptors: *Colorado River Basin, Recreation, *Carrying capacity, *Long-term planning, *Recreation demand, *Recreation facilities, *Land use, Arizona, New Mexico, Colorado, Wyoming, Nevada, California, Cost-benefit analysis, Environmental effects.
Identifiers: Environmental management.

Recreational use changes a site, and the number of users changes the recreational experience. Such facts force one to develop a concept of carrying capacity to determine the allocation and management of recreational resources. There are 5 categories of recreational land use: (1) Appreciative-symbolic; (2) Extractive-symbolic; (3) Passive free-play; (4) Sociable learning; (5) Active-expressive. There are five criteria for deciding which one of these uses recreational land will be put to: (1) Irreplaceability and relative abundance; (2) substitutability; (3) demand-preference relationship; (4)

complementarity-competitiveness relationship; and (5) cost. Unless some such standards and procedures are generally used in planning recreational developments long term mistakes are likely to be the result. (See also W75-07525) (Bowden-Arizona)
W75-07533

STRATEGIES FOR ENVIRONMENTAL PLANNING IN THE UPPER COLORADO RIVER REGION,
California Univ., Berkeley. Dept. of Landscape Architecture.
R. H. Twiss.
In: Environmental Management in the Colorado River Basin, October 15-16, 1973, Salt Lake City, Utah, Utah State University Press, Logan, 1974, p 102-117. 4 fig.

Descriptors: *Colorado River Basin, *Environmental engineering, *Environmental effects, *Long-term planning, *Land use, *Regional development, Arizona, Utah, Wyoming, Colorado, New Mexico, Nevada, California, Fossil fuels, Administrative agencies, Regional economics, Resource allocation.
Identifiers: Environmental management.

Will the Colorado River Basin be sacrificed to the energy crisis and molded by external pressures, or can it plan its own future. Nine levels of planning are reviewed. The environmental quality of the region will not be preserved merely by identifying and creating recreational areas. Something almost as comprehensive as a master plan is called for in the basin. Five predictions are made about the future of land planning in the basin: (1) zoning will have only a marginal success in land-use control; (2) it is not likely that the states in the basin will pass effective land use laws; (3) a federal land use policy act will pass within two years, but the law will result mainly in more studies; (4) federal agencies will continue to avoid a strong role in land use planning decisions; (5) the resultant vacuum in regional planning will be filled by public interest law firms and citizen lobbies. What is needed is a regional environmental planning agency and state laws on environmental quality. Also, regional studies should produce basic environmental inventory and constraint maps. The federal government should make the basin a single environmental unit and a single federal administrator should be appointed by the President to provide a focal point for federal activity in the region. (See also W75-07525) (Bowden-Arizona)
W75-07534

AN EXAMINATION OF THE ENVIRONMENTAL CARRYING CAPACITY CONCEPT FOR THE AGRICULTURAL SECTOR OF THE COLORADO RIVER BASIN,
New Mexico State Univ., University Park.
For primary bibliographic entry see Field 3F.
W75-07535

AGRICULTURE'S MANAGEMENT OF THE ENVIRONMENT IN THE COLORADO RIVER BASIN,
American Farm Bureau Federation, Salt Lake City, Utah. Natural Resources Dept.
For primary bibliographic entry see Field 3F.
W75-07536

FOSSIL FUELS AND POWER GENERATION IN THE COLORADO RIVER BASIN,
Brigham Young Univ., Provo, Utah. Dept. of Botany and Range Science.
For primary bibliographic entry see Field 3E.
W75-07537

POWER GENERATION AND THE COLORADO RIVER BASIN,
Utah Power and Light Co., Salt Lake City.
For primary bibliographic entry see Field 3E.
W75-07538

TRANSPORTATION AND REGIONAL ENVIRONMENTAL MANAGEMENT,
Wyoming Univ., Laramie. Dept. of Economics; and Div. of Business and Economic Research.
D. M. Blood.
In: Environmental Management in the Colorado River Basin, October 15-16, 1973, Salt Lake City, Utah, Utah State University Press, Logan, 1974, p 190-209, 23 ref.

Descriptors: *Colorado River Basin, *Transportation, *Air pollution, *Environmental effects, *Land use, Arizona, New Mexico, Utah, Colorado, Wyoming, California, Nevada, Regional development, Cost-benefit analysis, Growth rates.
Identifiers: Environmental management.

The United States has always lacked a unified transportation policy. Instead, it has had modal separatism with different funding and bureaucracies for water, rail, air, and automobiles. This diversity makes an estimate of transportation's effect on the environment difficult. The Colorado River Basin as a geographic area is not a real transportation unit since water and trade in the basin have different routes. Transportation generally impinges on the environment by shrinking distances, creating noise, generating air pollution, locating housing and by stimulating or curbing growth. The task of incorporating transportation considerations into a regional environmental framework is complicated by (1) regions outlined for one purpose do not necessarily make ideal units for analyzing function; (2) transportation decisions are hindered by the lack of national policy; (3) the base data for the interrelationship between the social, economic and environmental effects of transportation are lacking (4) transportation policy is tied to national land and water policy and cannot be pursued in regional isolation; (5) modern cost/benefit analysis of public expenditures has further complicated transportation decisions. (See also W75-07525) (Bowden-Arizona)
W75-07539

TRANSPORTATION IN THE COLORADO RIVER BASIN,
Boston Aschmann Associates, San Jose, Calif.
S. L. Hill.
In: Environmental Management in the Colorado River Basin, October 15-16, 1973, Salt Lake City, Utah, Utah State University Press, Logan, 1974, p 210-214, 1 tab.

Descriptors: *Colorado River Basin, *Roads, *Transportation, *Land management, *Environmental effects, Arizona, Utah, Nevada, New Mexico, Colorado, Wyoming, California, Access routes, Recreation.
Identifiers: Environmental Management.

Direct expenses for transportation represent 20 percent of the American Gross National Product. In the Colorado Basin, highways consitute the principal transportation investment. Most of the roads in the region are rural, and they have a direct effect on the carrying capacity of the land. The roads determine in good part the patterns of trade and housing, and have a direct effect on recreational exploitation of the region. Any concept of planning the basin based on adjusting use to the land's carrying capacity must regulate the expansion and condition of the roads. Roads in the region control access to the land. The National Environmental Policy Act, minimizing the negative environmental effects of roads, has become a major criteria in planning. Thus, in the basin, roads should not be just a response to population growth, but a tool to regulate use and exploitation of the land. (See also W75-07525) (Bowden-Arizona)
W75-07540

URBANIZATION IN THE COLORADO RIVER BASIN,
Utah State Univ., Logan. Dept. of Political Science.
For primary bibliographic entry see Field 4C.
W75-07541

URBANIZATION WITH OR WITHOUT ENVIRONMENTAL QUALITY,
United States International Univ., San Diego, Calif.
For primary bibliographic entry see Field 4C.
W75-07542

RESOURCE ALLOCATION AND MANAGEMENT IN THE COLORADO RIVER BASIN,
Utah State Univ., Logan. Dept. of Political Science.
For primary bibliographic entry see Field 6E.
W75-07543

CONCEPTS OF CARRYING CAPACITY AND PLANNING IN COMPLEX ECOLOGICAL SYSTEMS,
Colorado State Univ., Fort Collins. Dept. of Sociology and Anthropology.
For primary bibliographic entry see Field 6A.
W75-07544

THE DEVELOPMENT AND ENVIRONMENTAL PROTECTION OF THE COLORADO RIVER BASIN,
Utah Agricultural Experiment Station, Logan.
D. W. Thorne.
In: Environmental Management in the Colorado River Basin, October 15-16, 1973, Salt Lake City, Utah, Utah State University Press, 1974, Logan, p 298-313.

Descriptors: *Colorado River Basin, *Long-tern planning, *Resources development, *Urbanization, *Research priorities, Wyoming, Utah, Arizona, New Mexico, California, Nevada, Colorado, Research and development, Recreation, Transportation, Agriculture.

Various knowledge gaps hinder planning in the Colorado River Basin. A commission should be created by the various governors of the basin states to prepare goals for the region for the year 2000 and guidelines for attaining the goals. A full inventory of the region's resources must be prepared. The hydrocarbon resources of the basin should be investigated so that their potential for development in light of future technology can be assessed and the effect of exploiting them on the environment can be considered. Agricultural research is essential to mitigate the adverse effects of modern production of food and fiber, to increase the amount of this production, and to insure that the region will continue to supply such products. More data are needed on recreation so that this resources can be fully exploited for the benefit of all. Future urbanization in the basin should be considered in light of its effect on natural resources, transportation, natural beauty, and land use patterns. Future transportation needs and ways to meet than should be studied. Ways must be found for making concepts of environmental quality understandable and assessable to the public. (See also W75-07525) (Bowden-Arizona)
W75-07545

PUERTO RICO WATER RESOURCES PLANNING MODEL STUDY,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 6A.
W75-07568

RESIDENTIAL WATER USAGE CHANGE POTENTIAL RELATED TO ATTITUDES

TOWARD WATER AND KNOWLEDGE OF USAGE BEHAVIOR,
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
D. H. Carson.
Report October 1974. 6 p. OWRR B-024-PA (1). 14-31-0001-3121.

Descriptors: *Surveys, *Municipal water, *Water utilization, *Use rates, Attitudes, Water allocation(Policy), Behavior, *Pennsylvania.
Identifiers: State College(Pa).

Policies which reverse the pricing function, or which produce a U-shaped pricing function are inadequate to reduce residential water uses in locations where residential use may comprise a significant portion of total water use. In conjunction with the market and policy techniques to reduce residential water consumption, the feasibility of using direct behavioral change was explored along with attitude change potentials where change of verbal behavior was predictive of concomitant change in water use. A survey was conducted in three Pennsylvania communities, Centre Hall, a very small town which had some water problems and still was threatened by shortage; Bellefonte, a middle-sized town which has virtually no water resource problem, and State College, a small city, with no immediate water problems; the latter was the main sampling source. The survey was conducted by two series of questionnaires and monitoring devices on a continuous, 24-hour basis, combined with short interviews, and a simple diary form. Preliminary and causal questioning suggested that inidividuals would change in their awareness of water uses over the survey period. The initial evidence indicates that those uses which are generally considered inelastic--indoor domestic uses--might not change, but those which are elastic--outdoor uses--might be modified. (Auen-Wisconsin)
W75-07593

OPEN SPACE AND URBAN WATER MANAGEMENT PHASE I: GOALS AND CRITERIA,
North Carolina Univ., Chapel Hill. Dept. of City and Regional Planning.
K. Elfers, and M. Hufschmidt.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-241 737, $7.25 paper copy, $2.25 microfiche. North Carolina Water Resources Research Institute, Raleigh, UNC-WRRI-Report No 104, January 1975. 197 p, 3 fig, 2 tab, 235 ref. OWRT B-073-NC(1). 14-31-0001-4156.

Descriptors: Urban hydrology, *Land use, Water resources development, *Water management(Applied), Ecosystems, Planning, *PReservation, Management, Cities, Urbanization, *Land classification, Land management, Land resources, Interfaces, Earth-water interfaces, *City planning.
Identifiers: *Open space preservation.

The key elements are a discussion of critical variables and relationships involved in open space subsystems and a very comprehensive presentation of specific goals and criteria for open space preservation and management. Also included are discussions of various historical threads which have led to the present concern for open space preservation and management; these include the conservation movement and city beautiful era in this country, Federal policies and programs with regard to environmental quality and urban development, and the open space movement in the 1960's. Open space is defined to include both open and natural areas within built up urban areas and natural areas in the countryside that have characteristics such that they are suitable to be permanently preserved in a natural state or used for various open space purposes e.g., recreation. Open space elments are grouped into four basic subsystems: ecosystems such as wetlands and estuaries; land nodes such as prime agricultural lands and unusually scenic areas; water-land interfaces such as flood plains and shorelands; and urban spaces such as parks, plazas, utility corridors, and buffers. (Stewart-North Carolina State)
W75-07596

ALTERNATIVE INFORMATION AND INTERACTION APPROACHES TO PUBLIC PARTICIPATION IN WATER RESOURCES DECISION MAKING - A STATE-OF-THE-ARTS REPORT,
North Carolina State Univ., Raleigh. Dept. of Sociology and Anthropology.
A. C. Davis, J. Anderson, and R. I. Gough.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-241 736, $3.75 in paper copy, $2.25 in microfiche. North Carolina Water Resources Research Institute, Raleigh, UNC-WRRI Rept No 106, March 1975. 40 p, 14 fig, 88 ref. OWRT B-075-NC(2). 14-31-0001-4158.

Descriptors: *Water resources, *Decision making, *Information exchange, Reviews, Administrative decisions, Social aspects, Model studies, *Social participation, Alternative planning.
Identifiers: *Public participation, Citizen involvement.

A state-of-the-art presentation is made on research dealing with the information and interaction approaches to public participation in water resources decision-making. Public participation has been viewed from the standpoint of public administration, with concentration on the advantage and disadvantages of the information and interaction approaches to participation for water resources agency personnel and the publics. Seven decision-participation models including the various actors, their roles, and the exemplary techniques and time requirements associated with each are discussed. A review of the literature shows the many different techniques employed by agency personnel to involve the public in the decision-making process. The information in the interaction suggests a great deal of interest in and concern for public participation; however, few practical efforts have been made to include the public beyond the limited stage of the traditional public hearing. (Stewart-North Carolina State)
W75-07598

TEACHING WATER RESOURCE MANAGEMENT WITH THE AID OF A COMPUTER-IMPLEMENTED STIMULATOR,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Fisheries and Wildlife Sciences.
R. T. Lackey.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-241 753, Virginia Water Resources Research Center, Blacksburg, VPI-WRRC-Bulletin 78, March 1975. 98 p, 1 tab, 11 ref, 3 append. OWRT A-049-VA(4).

Descriptors: Water resources, *Management, Reservoir operation, *Computer programs, Reservoirs, *Multiple-purpose reservoirs, Model studies, Training, Education, Comprehensive planning.
Identifiers: Computer simulation, Teaching, Computer games, Multiple-use.

Computer-implemented learning exercises involving large system management should become an important natural resource educational tool. DAM, a computer-implemented water resource teaching game, illustrates the principles of managing a large multiple-use reservoir system. Stages in the development of DAM were: (1) model conceptualization; (2) model quantification and implementation; and (3) model refinement. The finished product is based on the use of economic and quantity numerical accumulators and a random number generating function. Management realism and role switching enhance DAM's value as a tool for acquainting students with management based on total system understanding.
W75-07601

APPROACHES TO WATER REQUIREMENT FORECASTING: A CANADIAN PERSPECTIVE,
Canada Centre for Inland Waters, Burlington (Ontario).
T. R. Lee.
Social Science Series No 9, 1972. 9 p, 1 fig, 22 ref.

Descriptors: *Canada, *Water demand, *Model studies, *Forecasting, Methodology, River basin development, Social impact, Economic impact, Water users, Economic prediction, Water quality, Competing uses, Simulation analysis.

The state of the art of water-requirement forecasting in Canada is assessed. Although Canada is fortunate in the extent and nature of her freshwater resources, there has been limited development of centralized water management. Historically, the predominant forecasting technique was a straight line projection based on previous needs per capita and estimated population. These techniques were used because of the lack of readily available information on water use. The development of an improved data base and the construction and testing of the first elaborate mathematical models of water use in specific river basins has begun. For example, the St. John River basin in New Brunswick has considered using mathematical programming and simulation models. The proposed end product is a national water forecasting model applicable to municipal, industrial, domestic, and agricultural sectors. The national model is intended to provide provincial and river basin breakdowns. Within the national model significant economic and social data will be integrated. Specifically, the future of water requirements forecasting was judged to be tied to the general relationship between overall economics and social development and water use, and the new technology available through electronic data processing and innovations in planning. (Becker-Wisconsin)
W75-07610

FORMAL PLANNING AND REPORTING SYSTEM: PROCEDURAL MANUAL,
Environmental Protection Agency, Washington, D.C. Office of Resources Management.
For primary bibliographic entry see Field 5G.
W75-07612

FISHERY RESOURCES FOR LAKE OF THE WOODS, MINNESOTA,
Minnesota Univ., St. Paul. Dept. of Entomology, Fisheries and Wildlife.
E. G. Heyerdahl, and L. L. Smith.
Available from the National Technical Information Service, Springfield, Va 22161, as COM-74-11564, $5.75 in paper copy, $2.25 in microfiche. Agricultural Experiment Station Technical Bulletin 288, 1972. 145 p, 33 fig, 30 tab, 18 ref, 1 append.

Descriptors: *Lake fisheries, *Commercial fishing, *Sport fish, *Minnesota, Fishing gear, Fish harvest, Growth rates, Sauger, Walleye, Fish management, Optimization, Economic impact, Yellow perch, Canada, Fish parasites, Fish populations.
Identifiers: *Lake of the Woods(Minn), Tullibee, Trawl fishing, Burbot, White sucker, Northern pike.

Because the commercial fishery harvests game as well as commercial species, the fishery has been criticized and suggestions have been made to discontinue commercial fishing operations entirely. The Minnesota Conservation Department has conducted a management program to effect a gradual reduction in commercial fishing by strict licensing control. This management approach was

complicated by the development of a large and important mink ranching industry which relies on the fish and an inexpensive food source. To resolve the problem of mink feed supply submerged trap net and trawl net gear were allowed under strict supervision. The concern of the local residents over the economic status of the fisheries and the related economic sector was aired at the state commission hearings. To develop management options, the Lake of the Woods commercial fishery was surveyed to determine the population structure of the various sport and commercial fish species; the catch characteristics with reference to size and age taken by various gear; whether certain commercial fish species could be exploited more heavily to the advantage of both fish protein production and sport fish yield; the effects of various commercial gear on the game fish species; and the type of utilization that will give maximum sport fishing together with maximum protein production. (Auen-Wisconsin)
W75-07613

REGIONAL GROWTH AND WATER RESOURCE INVESTMENT,
Utah State Univ., Logan. Dept. of Economics.
W. C. Lewis, J. C. Anderson, H. H. Fullerton, and B. D. Gardner.
D.C. Health and Company, Lexington, Mass. 1973. 181 p, 5 fig, 9 tab, 140 ref. AID-csd/2459.

Descriptors: *Economic impact, *Investment, *Income distribution, *Water resources development, Economic efficiency, Analytical techniques, Economic justification, Planning, Welfare(Economics), Theoretical analysis, Evaluation, Regional development.
Identifiers: *Impact analysis, *Quantitative techniques, Functional economic area, Accounting framework, Regional economic growth theory, Case studies.

The question of how investments in water resources development influence the pace and direction of regional economic growth is discussed since justification for the allocation of funds is sometimes partially based on the expectation of these influences. To evaluate the effectiveness of investments in water resources as a means to implement redistributions of wealth and income, the tools of economics, operations research and statistics are applicable. The functional economic area (FEA) delineation based on regional impacts is recommended over hydrologic delineations for use in economic analyses. Within the FEA, a complete analysis of efficiency and equity impacts for project investments should be made before project approval. The role of water resource development in regional growth was judged to be greatest in agriculture and small in nonagricultural industries, who view water as a cost factor of little importance and therefore a minor factor in location choice. A planning framework to assess the effects of an array of different kinds of water projects was developed. While this type of framework provides insights, the multidiminsional nature of regional development requires looking beyond the water-based projects investments to investment combinations, the long-run potential of economic development and national economic efficiency. (Becker-Wisconsin)
W75-07615

EEL RIVER DEVELOPMENT ALTERNATIVES. APPENDIX,
California State Dept. of Water Resources, Sacramento.
For primary bibliographic entry see Field 4A.
W75-07616

THE JOB IMPACT OF ALTERNATIVES TO CORPS OF ENGINEERS PROJECTS,
Illinois Univ., Urbana. Center for Advanced Computation.
B. M. Hannon, and R. H. Bezdek.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-227 820, $3.75 in paper copy, $2.25 in microfiche. Report NSF/RA/N-73-052, 1973. 28 p, 2 fig, 8 tab, 10 ref. DAHCO4 72-C-001, NSF GI 35179X.

Descriptors: *Projects, *Alternate planning, *Employment opportunities, Budgeting, Occupations, *Illinois, Regional economics, *Input-output analysis, Social aspects, Resource allocation, Waste treatment.
Identifiers: *Social programs, National health insurance, Social Security payments, Mass transit development, General tax relief.

An economic input-output model estimates the aggregate employment and detailed occupational changes likely to result from a shift of $1.13 billion from the projected 1975 Corps of Engineers construction budget to five alternate programs: National health insurance, Social Security payments, mass transit development, construction of waste treatment facilities, and general tax relief. Tas relief would increase direct and indirect employment 10.6$, national health insurance would increase employment 57.3%, Social Security benefits would generate an employment increase of 30.5%, mass transit construction would enhance employment by 6.9%, and waste treatment construction 30.3%. Analysis of the regional employment effects of a Corps water resource development project in West Frankfort, southern Illinois indicates that unemployment rose as the project was constructed, but employment also rose on the average on southern Illinois, indicating that the West Frankfort economy is keyed more with that of the region than to a dam, 8 miles away. The rationale is that Corps construction requires special skills not likely found in a small town with a population of 9000; rather these skills are drawn from several hundred miles away for their limited time of need. (Auen-Wisconsin)
W75-07618

HUMAN ECOLOGY AND THE ECOSYSTEM, (IN JAPANESE),
Institute of Population Problems, Tokyo (Japan).
For primary bibliographic entry see Field 6G.
W75-07750

DOES CANOEING INCREASE STREAMBANK EROSION,
Forest Service (USDA), St. Paul, Minn. North Central Forest Experiment Station.
For primary bibliographic entry see Field 2J.
W75-07792

6C. Cost Allocation, Cost Sharing, Pricing/Repayment

THE CENTRAL ARIZONA PROJECT, A STAFF REPORT TO THE METROPOLITAN UTILITIES MANAGEMENT AGENCY BOARD AND THE MAYOR AND COUNCIL OF THE CITY OF TUCSON,
Tucson Metropolitan Utilities Management Agency Board, Ariz.
For primary bibliographic entry see Field 4B.
W75-07372

TEXAS WATERBORNE COMMERCE COMMODITY FLOW STATISTICS,
Texas Transportation Inst., College Station.
For primary bibliographic entry see Field 6B.
W75-07376

JAPAN: A SURVEY OF PORTS, DEEP WATER TERMINALS, AND VESSELS,
Army Engineer District, San Francisco, Calif. Economics Branch.
W. Yep.
Army Engineer Institute for Water Resources, Center Paper 73-1, June 1973. 304 p, 39 plates, 4 tab, 7 ref, append.

Descriptors: *Harbors, *Ships, Technology, Foreign countries, *Transportation, Oil, Facilities, Off-shore platforms, Dredging, Environmental effects.
Identifiers: *Japan, *Deep-water terminals, Oil tankers, Monobuoy systems, Containerships, Maritime industry, Deep-draft vessels, Container terminals.

Construction and maintenance of principal harbors and port facilities in Japan are under the jurisdiction of the Ministry of Transport. Expenditures scheduled for port development from 1971 through 1975 total $6.2 billion. As of 1972, their fleet of VLCC (very large crude carriers) consisted of five tankers, ranging from 153,685 dwt to 477,000 dwt with a draft of 28 m. Plans are drawn for 750,000 and 1,000,000 dwt tankers. The predominant means for handling the unloading of crude petroleum from VLCC are sea berths (offshore platforms). These are fixed terminals capable of handling up to 500,000 dwt. Their capital costs range between $25-40 million per platform. Operation and maintenance costs range between 1-3% of capital costs. There are also at least nine mobile single-buoy mooring systems (monobuoys) to handle VLCCs. The SBM terminal is capable of unloading, bunkering, and deballasting operations simultaneously. Their construction and installation time is usually one year or less. Capital costs for SBM for handling a 250,000 dwt tanker is approximately $2 million. However, they experience operational difficulties in adverse weather and are susceptible to high maintenance costs. The latest iron ore handling facilities and vessels, containerships and LASH (lighter aboard ships) vessels are discussed. Vessels, ports, and facilities are profusely detailed. (Auen-Wisconsin)
W75-07379

DYNAMIC PROGRAMMING FOR OPTIMAL CAPACITY EXPANSION OF WASTEWATER TREATMENT PLANTS,
Case Western Reserve Univ., Cleveland, Ohio. Systems Engineering Div.
For primary bibliographic entry see Field 5D.
W75-07390

WATER DESALTING IN HAWAII,
Holmes and Narver, Inc., Anaheim, Calif. Nuclear and Systems Sciences Group.
For primary bibliographic entry see Field 3A.
W75-07506

A NOTE ON COSTS OF COLLECTING HYDROMETRIC FLOW DATA IN THE UNITED STATES,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 7A.
W75-07578

TEN COUNTIES INVESTIGATION: MUNICIPAL, INDUSTRIAL AND ARGICULTURAL WATER DEMAND IN COLUSA, GLENN, HUMBOLDT, LAKE, MARIN, MENDOCINO, NAPA, SOLANO, SONOMA, AND YOLO COUNTIES,
California State Dept. of Water Resources, Sacramento.
For primary bibliographic entry see Field 6D.
W75-07611

REGIONAL GROWTH AND WATER RESOURCE INVESTMENT,
Utah State Univ., Logan. Dept. of Economics.
For primary bibliographic entry see Field 6B.
W75-07615

EEL RIVER DEVELOPMENT ALTERNATIVES. APPENDIX,
California State Dept. of Water Resources, Sacramento.
For primary bibliographic entry see Field 4A.
W75-07616

THE JOB IMPACT OF ALTERNATIVES TO CORPS OF ENGINEERS PROJECTS,
Illinois Univ., Urbana. Center for Advanced Computation.
For primary bibliographic entry see Field 6B.
W75-07618

A COMPUTER PROGRAM FOR ESTIMATING COSTS OF TUNNELLING (COSTUN),
Harza Engineering Co., Chicago, Ill.
For primary bibliographic entry see Field 8B.
W75-07619

ECONOMIC FEASIBILITY OF DESALTING SYSTEMS FOR MUNICIPAL WATER SUPPLY IN IOWA,
Dewild Grant Reckert and Associates, Des Moines, Iowa.
For primary bibliographic entry see Field 3A.
W75-07631

EVALUATION OF ALTERNATIVE METHODS FOR FINANCING MUNICIPAL WASTE TREATMENT WORKS,
Meta Systems, Inc., Cambridge, Mass.
For primary bibliographic entry see Field 5D.
W75-07693

6D. Water Demand

EFFICIENT USE OF WATER - POLICY AND PROBLEMS,
Ministry of Agriculture, Tel-Aviv (Israel). Water Commission.
S. Arlosoroff.
In: Israel's Water Economy, Ministry of Agriculture, Water Commission, Tel Aviv. December 1973. p 14-20.

Descriptors: *Water utilization, *Water conservation, *Water demand, *Water consumption, *Water reuse, Efficiencies, Water costs, Marginal utility, Irrigation systems, Domestic water, Industrial water, Agriculture, Technology.
Identifiers: *Israel.

A major effort will be needed to save water, by using water more efficiently, and by using marginal waters in order to maintain a reasonable rate of growth in that part of Israel's national income dependent on irrigated agriculture. The water use sectors are evaluated from the aspect of water economy measures. First is the industrial sector which uses the smallest quantity of water but has had the largest relative growth in the last decade. Ways of reducing water consumption here include the introduction of drier industrial processes, reclamation of industrial effluents, and use of marginal waters such as urban wastes and saline water. Second is the urban and domestic sector where consumption is primarily influenced by the rise in living standards. Activity in this area is limited to technological development of appliances designed to save and more efficiently use water. Third is the agricultural sector which accounts for some 75 percent of all water used in Israel. Activities for more efficient use consist of development of more efficient irrigation systems and encouraging the introduction of these methods by granting loans at low interest rates. (Mastic-Arizona)
W75-07401

ISRAEL'S WATER ECONOMY AND ITS PROBLEMS IN THE EARLY SEVENTIES,
Tahal Consulting Engineers Ltd., Tel-Aviv (Israel). Long Range Planning Section.
E. Kally.
In: Israel's Water Economy, Ministry of Agriculture, Water Commission, Tel Aviv, December 1973. p 21-36, 1 tab.

Descriptors: *Water supply, *Water quality, *Brackish water, *Saline water, *Long term planning, Water consumption, Water demand, Desalination, Artificial precipitation, Agriculture, Industrial water, Water reuse, Sewage treatment, Groundwater mining.
Identifiers: *Israel.

Data and problems of Israel's water economy are reviewed in connection with long-range planning. Although water consumption is about 500 cu m annually per person for all uses - domestic, industrial, and agricultural, almost all of the available water that can be economically utilized is already in regular use. The problem is how to conduct and expand the country's water economy under the conditions of growing demand against a limited supply. Alternatives include limiting and better conservation of present water supplies or increasing actual yields by treating and utilizing brackish or other low quality water, by creating artificial rainfall, converting saline water, and mining the underground reservoirs. It may also become necessary to reduce the allocation of fresh water to agriculture, replacing it with water of marginal quality and transferring fresh waters to urban consumers. These changes may come about before the middle of the next decade. (Mastic-Arizona)
W75-07402

MANAGEMENT OBJECTIVES IN THE COLORADO RIVER BASIN: THE PROBLEM OF ESTABLISHING PRIORITIES AND ACHIEVING COORDINATION,
Bureau of Reclamation, Salt Lake City, Utah. Upper Colorado Region.
For primary bibliographic entry see Field 6B.
W75-07527

CRITERIA FOR THE DETERMINATION OF RECREATIONAL CARRYING CAPACITY IN THE COLORADO RIVER BASIN,
Forest Service (USDA), Missoula, Mont. Northern Forest Fire Lab.
For primary bibliographic entry see Field 6B.
W75-07533

HAS WISCONSIN ENOUGH WATER,
Geological Survey, Madison, Wis.
C. L. Holt.
Wisconsin Academy Review, Vol 21, No 1, p 30-31, Winter 1974-75.

Descriptors: *Water supply, *Wisconsin, *Water utilization, Streamflow, Groundwater, Surface waters, Water yield, *Water demand, Hydrologic budget.

The total amount of water available in Wisconsin remains essentially the same as it was more than 200 years ago. Although momentary yields of water are limited, it is a replenishing resource. Precipitation brings annually about 31 inches of water to the land's surface. Of this, about 10 inches enters streams and eventually flows out of the State. The rest returns to the atmosphere by evaporation and transpiration. A total of 6.3 billion gallons of water-about one-fifth of the average daily flow of all streams flowing from Wisconsin-is withdrawn daily from lakes, streams, and groundwater. From 1965 to 1970, water use in the State increased about 23% with much of this increase being for generation of thermoelectric power and for industrial growth. Withdrawals for municipal water-supply systems increased less than 5%, going from 440 mgd in 1965 to 480 mgd in 1970. The average daily streamflow in Wisconsin is about double the projected water requirements for the year 2000. Stored groundwater supplies are many times larger. (Knapp-USGS)
W75-07580

APPROACHES TO WATER REQUIREMENT FORECASTING: A CANADIAN PERSPECTIVE,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 6B.
W75-07610

TEN COUNTIES INVESTIGATION: MUNICIPAL, INDUSTRIAL AND ARGICULTURAL WATER DEMAND IN COLUSA, GLENN, HUMBOLDT, LAKE, MARIN, MENDOCINO, NAPA, SOLANO, SONOMA, AND YOLO COUNTIES,
California State Dept. of Water Resources, Sacramento.

Descriptors: *California, *Water demand, *Forecasting, Municipal water, Industrial water, Agriculture, Planning, Water supply, Water rates.
Identifiers: Colusa County(Calif), Glenn County(Calif), Humboldt County(Calif), Lake County(Calif), Mendocino County(Calif), Napa County(Calif), Solano County(Calif), Sonoma County(Calif), Yolo County(Calif).

The future economic water demands of each of the ten North San Francisco Bay counties are projected to year 2020 as a basis for determining alternative water conveyance routes from the Eel River to the Sacramento-San Joaquin Delta. The total demand for these counties, at current prices, in 1990 (in 1000-acre ft/yr) for agriculture will be 272 and for municipal and industrial uses 88; and in 2020, 455 and 535, respectively. At water rates of $20/acre foot, the demand projected for agriculture in 1990 is 93 and municipal and industrial at 88; for 2020, 154 and 535, respectively. The demands for supplemental agricultural water supplies in certain service areas would be significantly influenced by the pricing policies of the marketing agencies. The additional water supplies needed in the ten-county area in year 2020 to satisfy demands for municipal-industrial and agricultural water at prices similar to those currently prevailing within the various service areas would amount to about 990,000 acre-feet annually. The factors considered in the estimates were basic land suitability for development, population growth, urban expansion, industrial development types, unit water use values, crop marketing prospects, areal allocations of crop acreage, payment capacity limitations, and information on presently developed and utilized water supplies. (Auen-Wisconsin)
W75-07611

6E. Water Law and Institutions

ECONOMIC IMPLICATION OF PUBLIC WATER POLICY IN ARIZONA,
Arizona Univ., Tucson. Dept. of Agricultural Economics.
M. M. Kelso, D. A. Bingham, W. E. Martin, H. Padfield, and D. F. Paulsen.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-241 513, $5.75 in paper copy, $2.25 in microfiche. Completion Report, October 1974. 133 p, 1 fig, 2 tab. OWRT B-003-ARIZ(15). 14-01-0001-1001.

Descriptors: *Water policy, Water law, Water rights, *Arizona, *Institutions, *Water utilization, *Organizations, Water management(Applied), Institutional constraints, Economics.
Identifiers: Tucson Metropolitan Area(Ariz), Phoenix Metropolitan Area(Ariz), Salt River Project(Ariz).

Water institutions may be broadly divided into two categories--(1) water rights law and (2) water or-

ganizations law. This research is concerned largely with the second of these. The research examined the Tucson Metropolitan Area, the Phoenix Metropolitan Area, and the Salt River Project as a major component of the latter area. The extensive and complex fractionation of water management in areas overlying separable but unified natural water systems together with restraints on the transfer of rights and of water as between uses, users, and locations of use within and between these areas are the primary sources of the economic inefficiencies and inequities in water use. To improve economic welfare in Arizona relative to water use necessitates revising water institutions to secure unified management of separable but unified natural water systems. At the same time the advantages should be retained of independent firm and household decision making relative to water use and development.
W75-07351

USE OF ENVIRONMENTAL ANALYSES ON WASTEWATER FACILITIES BY LOCAL GOVERNMENT,
Teknekron, Inc., Washington, D.C. Applied Research Div.
For primary bibliographic entry see Field 5D.
W75-07360

WATER RIGHTS,
Wisconsin Univ., Madison. School of Law.
J. B. MacDonald, and J. H. Beuscher.
American Printing and Publishing, Inc., Madison, Wis. 1973. 668 p. Second edition.

Descriptors: *Water rights, *Water law, *Riparian rights, Zoning, *Public rights, Pollution abatement, Governmental interrelations, Wisconsin, Surface waters, Drainage practices, Percolating water, Competing uses, Watercourses(Legal aspects), Water allocation(Policy), Groundwater, *Judicial decisions, Equity, Reasonable use, Navigable waters, Recreation, Prior appropriation, Interstate compacts.
Identifiers: Private rights.

Interpretations of water law by judicial decisions and further elucidated by editorial comments includes the following areas: Diffused surface water is prescribed by rulings on definition of surface waters, watercourses, and Wisconsin drainage laws. Adjudications of several state supreme courts, appelate courts, and a chancery court define the law of percolating ground water. Government levels and systems for identification of private rights in watercourses are described, followed by legal origins of the riparian theory in Anglo-American law, criteria for rationing competing water users and riparian rights, land as a basis for water allocation involving riparian vs. non-riparian land, supplemented by rulings firming up water rights in riparian states. Aquisitions of water rights under the appropriation system also delineates water adjudicative and distribution institutions in appropriation states. Limitations imposed on private water rights by assertions of public interest by both the federal and state governments are substantiated by decrees. Water allocation between states is defined by the courts, by interstate compacts, by federal legislation, and by treaty. The Supreme Court and the Western District Court of Texas rulings exemplify decisions on exportation of waters from one state to another. The final chapter discusses the role of the courts and specialized administrative agencies in pollution abatement. (Auen-Wisconsin)
W75-07378

ORIENTING STATE WATER LAWS,
Nevada Univ., Reno. Desert Research Inst.
J. C. Ohrenschall.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-241 712, $3.75 in paper copy, $2.25 in microfiche. Nevada Center for Water Resources Research, Reno, Project Report No. 27, February 1975. 40 p, 31 ref. OWRT B-023-NEV(1). 14-031-0001-1921.

Descriptors: *Water law, *Riparian rights, Southwest U.S., *Nevada, *California, *Arizona, *Dual system, *Prior appropriation, Legislation, Water utilization, *Water rights, State governments.

The development of relevant legislation governing water is paramount in the Western United States because of the increasing demand upon the resource. This research investigates the water laws of California, a dual-doctrine state, and Arizona and Nevada which are appropriative in water law determinations. The three-state water systems are analyzed to determine the historical and sociopolitical bases for various legal classifications of water and the managerial framework which has evolved. Definitions of the various physical states of water are explained with emphasis on those whose poor definition may cause misuse of the resource. By relying on scientific and technological data, suggestions are made for achieving more viable legislation that can aid in the promotion of better water utilization. (Fallon-Nevada)
W75-07396

LAND AND WATER USE IN OREGON,
Oregon State Univ., Corvallis. Water Resources Research Inst.
For primary bibliographic entry see Field 6B.
W75-07507

ADJUDICATION IN LAND-WATER DISPUTES,
Oregon Div. of State Lands, Salem.
S. F. Hamilton.
In: Land and Water Use in Oregon; Seminar conducted by Oregon State University, Spring Quarter 1974, Water Resources Research Institute, Corvallis, Oregon, p 45-50, July 1974.

Descriptors: *Legislation, *Water law, *Oregon, *Law enforcement, Dredging, Channel improvement, Excavation, Channels, Banks, Shores, Shore protection, Environment, Surface waters, Rivers, Streams.
Identifiers: Oregon removal-fill law.

The organization and functions of the Division of State Lands was described. The state removal-fill law was reviewed and its effect on land management in Oregon was discussed. Current land-water disputes around the state were summarized, along with a description of the permit and enforcement procedures used in the administration of the removal-fill law. This law regulates activities affecting streams and their shorelines such as channel dredging for navigation and commercial sand and gravel, excavation projects, channelization, bank stabilization, and construction in or along the waters of Oregon. (See also W75-07507) (Sims-ISWS)
W75-07511

CONSUMER PROTECTION AND LAND USE,
Oregon Real Estate Div., Salem.
For primary bibliographic entry see Field 6B.
W75-07512

WILLAMETTE RIVER PARKS SYSTEM,
Willamette River Parks System, Salem, Oreg.
For primary bibliographic entry see Field 6B.
W75-07513

THE SEPTIC TANK'S ROLE IN LAND USE,
Oregon State Dept. of Environmental Quality, Portland.
For primary bibliographic entry see Field 5D.
W75-07514

CONSTITUTIONAL RESTRICTIONS ON COASTAL LAND USE,
Oregon State Land Conservation and Development Commission, Portland.
S. R. Schell.
In: Land and Water Use in Oregon; Seminar conducted by Oregon State University, Spring Quarter 1974, Water Resources Research Institute, Corvallis, Oregon, p 77-95, July 1974. 28 ref.

Descriptors: *Legal aspects, *Planning,. *Land use, *Oregon, Administrative agencies, Judicial decisions, Comprehensive planning, Legislation, Regional development, Estuarine environment, Coasts, Wetlands, Coastal marshes, Regulation, Zoning.

The laws and court decisions relating to land use planning in the coastal areas of Oregon were examined. Cases from California and Maine were reviewed. The objectives of land use regulation were discussed. It was concluded that power does exist to control and channel growth in Oregon; however, this power must be used circumspectly. Although Oregon probably cannot say that it will not grow, it may, however, shift further population growth to relatively undeveloped portions of the state by the use of direct and indirect mechanisms. (See also W75-07507) (Sims-ISWS)
W75-07515

WATER QUALITY PLANNING FOR THE DELAWARE ESTUARY - AN EXAMPLE,
Rutgers - the State Univ., New Brunswick, N.J. Water Resources Research Inst.
For primary bibliographic entry see Field 5G.
W75-07519

BASIN-WIDE PLANNING AND THE PROBLEM OF MULTIPLE JURISDICTIONS,
Ferris, Weatherford and Brennan, San Diego, Calif.
G. D. Weatherford.
In: Environmental Management in the Colorado River Basin, October 15-16, 1973, Salt Lake City, Utah, Utah State University Press, Logan, 1974, p 1-16. 21 ref.

Descriptors: *Colorado River, *Colorado River Basin, *Water supply, *Water allocation, *Resource allocation, Arizona, Utah, New Mexico, Colorado, California, Nevada, Wyoming, Regional analysis, Jurisdiction, Environmental effects, Air pollution, Water pollution, Planning.
Identifiers: Environmental management.

Pluralism of institutions (city, county, state, regional, federal, international) presently impairs basin wide planning for environmental management of the Colorado River. Large public ownership of land in the basin does not make the area ideal for planning because the land falls under the jurisdiction of various agencies with different goals. The 7 states, 2 nations, 30 tribes, 70 counties and various cities having jurisdiction in the region only unite to exploit it. Some future developments (the Central Arizona Project, energy industries) or drought could trigger an enforced reduction in water use. Augmentation of the water supply by importation may unite diverse factions but such plans would probably create more environmental issues than they would answer. A possible solution might be to create a federal commission to oversee the basin's environment on a research and data collection level. Such a Commission would be a first step toward a basin wide planning authority. (See also W75-07525) (Bowden-Arizona)
W75-07526

COLORADO RIVER MANAGEMENT AND INTERNATIONAL LAW,
International Law Association, Mexico City.
C. Sepulveda.

In: Environmental Management in the Colorado River Basin, October 15-16, 1973, Salt Lake City, Utah, Utah State University Press, Logan, 1974, p 59-66.

Descriptors: *Colorado River, *Colorado River Basin, *International Bound. and Water Comm., *Mexico, Arizona, Utah, California, Nevada, Colorado, Wyoming, Salinity, Water law, International Waters.
Identifiers: Environmental management.

The 1944 Water Treaty between the United States and Mexico moved international river law from a concern with navigation and boundaries toward establishing a contractual basis between nations for water delivery. However, the treaty failed to foresee large Mexican developments on the Lower Colorado and may have set the level of Mexican water use too low. By examining the handling of the salinity issue by the Boundary and Water Commission since 1961, one can see the evolution of new facets of international river law. In 1961, discharge from Arizona's Wellton Mohawk area caused vast damage to downstream Mexican farmers. Mexican protest on the basis of the 1944 treaty met American evasions. Technical experts agreed that American handling of the discharge had not been correct. In 1965 the United States agreed to channel Wellton Mohawk discharge to the Gulf of California. This lowered both the salinity and amount of Mexican water. A new agreement in 1972 settled both the quality and amount of water due Mexico. Thus the legal point was made that downstream users have the same water quality rights as upstream users. (See also W75-07525) (Bowden-Arizona)
W75-07530

FUTURE DIRECTIONS IN ENVIRONMENTAL LEGISLATION,
C. Braithwait.
In: Environmental Management in the Colorado River Basin, October 15-16, 1973, Salt Lake City, Utah, Utah State University Press, Logan, 1974, p 75-81.

Descriptors: *Colorado River Basin, *Environmental effects, *Pollution abatement, *Air pollution, *Water pollution, Arizona, Utah, New Mexico, California, Nevada, Wyoming, Colorado, Legislation, Land reclamation, Regional development.
Identifiers: Environmental management.

Environmental legislation will benefit long-term growth in the Colorado River Basin. By limiting pollution, preventing environmental degradation, and protecting natural resources, such laws preserve the basis for development and growth. Put simply, pollution limits growth; laws limiting pollution enhance growth. For example, the requirement of producing an environmental impact statement before surface mining may commence protects the region on from damaged land and aquifers and thus insures that the basis for future growth will be maintained. Another virtue of pollution laws is that they threaten monopolies. Often small companies are much more flexible than huge corporations in meeting the new environmental standards. Far from being anti-technology, environmental legislation demands the invention of new technology to protect the land, air, and water. Also, such laws will not lower the standard of living if one considers the importance of the quality of life. Any successful regional effort to protect and clean up the environment will find federal money essential. (See also W75-07525) (Bowden-Arizona)
W75-07532

RESOURCE ALLOCATION AND MANAGEMENT IN THE COLORADO RIVER BASIN,
Utah State Univ., Logan. Dept. of Political Science.
J. Baden, H. H. Fullerton, and J. Neuhold.
In: Environmental Management in the Colorado River Basin, October 15-16, 1973, Salt Lake City, Utah, Utah State University Press, Logan, 1974, p 261-280, 8 ref.

Descriptors: *Colorado River Basin, *Resource allocation, *Federal government, *Administrative agencies, Arizona, New Mexico, Wyoming, Colorado, Utah, Nevada, California.
Identifiers: Environmental management.

The Colorado River Basin has natural resources of high value and there will be pressure to extract these resources for use outside the basin. The terms for this extraction have yet to be decided upon. Many of the social costs to be paid for such an exploitation of the resources will be at the point of production, but much of the power to make such decisions lie outside the Basin in Congress, federal agencies, and national corporations. Information is essential to high quality allocation decisions, and the best information seems to come from disinterested third parties. Thus, it is to be hoped that such institutions will be utilized and the plans for allocation will be flexible. (See also W75-07525) (Bowden-Arizona)
W75-07543

THE DEVELOPMENT AND ENVIRONMENTAL PROTECTION OF THE COLORADO RIVER BASIN,
Utah Agricultural Experiment Station, Logan.
For primary bibliographic entry see Field 6B.
W75-07545

ALTERNATIVE INFORMATION AND INTERACTION APPROACHES TO PUBLIC PARTICIPATION IN WATER RESOURCES DECISION MAKING - A STATE-OF-THE-ARTS REPORT,
North Carolina State Univ., Raleigh. Dept. of Sociology and Anthropology.
For primary bibliographic entry see Field 6B.
W75-07598

LANDSCAPE TENDING AND NATURE CONSERVATION AS PARTIAL TASKS FOR SOCIALISTIC LAND DEVELOPMENT,
For primary bibliographic entry see Field 4A.
W75-07707

PROJECT AQUA NORWEGIAN IB (INTERNATIONAL BIOLOGICAL PROGRAM)/PF, (IN NORWEGIAN),
Zoologisk Museum, Oslo (Norway).
For primary bibliographic entry see Field 2A.
W75-07749

NELSON V. BUTZ (ACTION SEEKING INJUNCTION AND DECLARATORY RELIEF RELATING TO CONSTRUCTION OF PROPOSED DAM).
377 F. Supp. 819 (D. Minn. 1974).

Descriptors: *Minnesota, *Judicial decisions, *Environmental effects, *Standards, Dam construction, Rivers, Water law, Legal aspects, Federal government, Federal jurisdiction, Administrative agencies, Water management(Applied), Flood protection, Reservoirs, Reservoir construction, Reservoir operation, Engineering structures, Dams, Legislation, Alternative planning, Archaeology, Cost-benefit analysis, Flooding, Comprehensive planning.
Identifiers: *Dam effects, *Environmental impact statement, Declaratory judgments, Injunctive relief, National Environmental Policy Act, Environmental policy.

The plaintiffs, individual citizens, brought action seeking declaratory and injunctive relief against the defendant federal agency (Dept. of Agriculture) with respect to the proposed construction of a dam on the Knife River, in Minnesota. The plaintiffs contended that the environmental impact statement prepared by the defendant for the project failed to comply with the National Environmental Policy Act and guidelines promulgated by the Council on Environmental Quality. The Federal District Court held that while every particular detail need not be discussed in the statement, where particularly unique aspects of the environment are affected, the statement should note them in some detail. The court ruled that the statement did not adequately discuss the environmental effects of the project on mature trees, the inundation of certain islands, the archeological sites, the alternatives to building the dam, and the cost-benefit analyses. The court enjoined the defendant from proceeding with the project until such time as an environmental statement which is in compliance with the NEPA and this decision, is properly filed. (Deckert-Florida)
W75-07757

U.S. V. STATE OF ALASKA (SUIT TO QUIET TITLE TO PART OF INLET ON ALASKAN COAST, ETC).
497 F.2d 1155 (9th Cir. 1974).

Descriptors: *Judicial decisions, *United States, *Alaska, *Boundaries(Legal aspects), *Inlets(Waterways), *Federal-state water rights conflicts, Natural resources, Land tenure, Oceans, Oil industry, Bays, International law, Measurement, Coasts, Shores, Submerged Lands Act, Jurisdiction, Leases, Oil, Exploration, State jurisdiction, Legislation.
Identifiers: Seabed mining, Territorial seas(Jurisdiction), Injunctive relief, Coastal waters, Public trust doctrine, Territorial waters, State policy.

Action was brought by the United States against the State of Alaska to quiet title to the lower part of an inlet located on the Alaskan coast. Injunctive relief was also sought to stop Alaska from offering oil and gas leases for sale in the area. The district court for Alaska held in favor of the state. On appeal the lower court's ruling that the inlet was an inland waterway and that its subsurface resources belonged to Alaska was upheld. The lower part of Cook Inlet was forty-seven miles wide at its natural entrance points. It was not an inland bay as defined in the Convention on the Territorial Sea and the Contiguous Zone which requires a distance of no more than twenty four miles between natural entrance points. The Submerged Lands Act provides that the state is entitled to natural resources of the seabed in waters up to three geographical miles seaward from the coastline or its equivalent, as drawn by connecting land openings of water inlets, and that water landward from the line forming an equivalent coastline are inland waters belonging to the state. (Sperling-Florida)
W75-07758

MIKEL V. KERR (ACTION TO QUIET TITLE TO TRACT OF LAND WHICH LAY AT THE CONFLUENCE OF TWO RIVERS).
499 F.2d 1178 (10th Cir. 1974).

Descriptors: *Land tenure, *Riparian land, *Judicial decisions, *United States, *Oklahoma, Riparian rights, Rivers, Boundaries(Property), Accretion(Legal aspects), Avulsion, Watercourses(Legal aspects), Navigable waters, Meanders, Water law, Decision-making, Adoption of practices, Boundary disputes, Adjudication procedure.
Identifiers: Water rights(Non riparians).

Appeal was made to the United States Court of Appeals from an action to quiet title to a certain tract of land which lay at the confluence of two rivers. The court held that under Oklahoma law, when real property, which is riparian and has identifiable boundaries, is submerged by gradual movement of a river, and is then subsequently

restored by gradual recession of such river, title to such property remains in the owner of record title and does not vest, pursuant to the law of accretion. Under the law of accretion ownership would vest in an adjacent owner whose land was not originally riparian, but which has become riparian by means of the river's gradual movement. This holding is not limited to cases where the river changes course by avulsion or by the fact that the river is navigable. While the navigability of a waterway may be an important factor for certain rights of riparian owners, navigability had no effect on the instant case. (Sperling-Florida)
W75-07759

GOVERNMENT VIEWS ON WATER POLLUTION CONTROL,
Federal Water Pollution Control Administration, Washington, D.C.
For primary bibliographic entry see Field 5G.
W75-07760

UNITED STATES V. RESERVE MINING CO. (ACTION ON REMAND FROM EIGHTH CIRCUIT ON SUIT TO ENJOIN MINING CO FROM DISCHARGING CARCINOGENICS INTO INTERSTATE WATERS).
For primary bibliographic entry see Field 5G.
W75-07761

SCENIC HUDSON PRESERVATION CONFERENCE V. CALLAWAY (SUIT BY CONSERVATIONISTS TO ENJOIN HYDRO-ELECTRIC PLANT CONSTRUCTION).
370 F. Supp. 162 (S.D. N.Y. 1973).

Descriptors: *Water conservation, *Judicial decisions, *Hydroelectric plants, *Dredging, *New York, Hydroelectric power, Engineering structures, Powerplants, Industrial plants, Water utilization, Excavation, Drainage engineering, Legislation, Federal Water Pollution Control Act, Rivers and Harbors Act, Water resources development, Water law, Hudson River.
Identifiers: *Injunctive relief.

Suit was brought in the United States District Court to enjoin construction of a hydroelectric plant until the defendant utility company obtained permits from the Army Corps of Engineers. Plaintiffs sought to forbid conduct consisting of dredging in the Hudson River for construction of intake facilities for the underground powerhouse and the depositing of the dredged material into the river. Plaintiffs argued that the defendant was required to obtain permits from the Army Corps of Engineers pursuant to the Rivers and Harbors Act of 1899 and the Federal Water Pollution Control Act of 1972. The defendant contended that the permit authority of the Corps was removed by the Federal Power Act of 1920. The court held that while the Corps' authority to grant permits under the Rivers and Harbors Act was preempted by the Federal Power Act, the defendant was required, nevertheless by the Federal Water Pollution Control Act to seek a permit from the Corps for discharge of dredged or fill materials into the Hudson River. (Proctor-Florida)
W75-07762

SEA BEACH ASSOCIATION, INC. V. WATER RESOURCES COMMISSION (APPEAL FROM GRANTING PERMIT TO BUILD A PILE AND TIMBER PIER, ETC.).
318 A.2d 115 (Conn. 1972).

Descriptors: *Piers, *Coastal structures, *Judicial decisions, *Connecticut, Riparian rights, Engineering structures, Permits, Piles(Foundations), Legislation, Water law, Water resources development, Environmental effects.
Identifiers: *Standing(Legal), *Coves, *State agency.

Appeal was taken from an order of the Connecticut State Water Resources Commission issuing a permit to construct a pile and timber pier into the waters of Long Island Sound. Plaintiffs, property owners, alleged that they had been aggrieved by the granting of the permit. The Commission ruled that the plaintiffs were not aggrieved parties within the statute and were therefore without standing to sue. The order of the Commission was upheld on grounds that plaintiffs had failed to show a specific personal and legal interest in the subject matter as opposed to a general interest. (Proctor-Florida)
W75-07763

A TURNING POINT,
Department of Housing and Urban Development, Washington, D.C.
For primary bibliographic entry see Field 6F.
W75-07765

WASTEWATER IRRIGATION: ITS LEGAL IMPACT,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Water Resources Research Center.
W. R. Walker, and W. E. Cox.
Water Spectrum, Vol 6, No 2, p 15-22 (1974). 9 photo, 1 chart.

Descriptors: *Water demand, *Waste water disposal, *Treatment facilities, *Water supply, Water shortage, Legal aspects, Water resources, Cost analysis, Reclamation, Sewage effluents, Treatment facilities, Federal Water Pollution Control Act, Legislation, Waterpolicy, Federal government, Water pollution, Navigable waters, Aquiculture, Regulation, Administrative agencies.
Identifiers: *FWPCA Amendments of 1972.

Future world demand for production of agricultural commodities will strain available water supplies. Legal attitudes toward the role of waste water resources in the economy will need to be changed. Recycling municipally produced sludge and effluent as an alternative form of waste disposal has not had the benefit of as in-depth an evaluation as have other methods. The first comprehensive effort at waste water management at the federal level came with the passage of the Water Pollution Control Act of 1948. It was not until the 1972 Amendments to the Federal Water Pollution Control Act that a national policy was established to eliminate discharge of pollutants into navigable waters. The 1972 Amendments specifically refer to recycling potential sewage pollutants in connection with agriculture, silviculture, or aquiculture. Regulations promulgated by the Environmental Protection Agency for implementing the Amendments contain guidelines for cost effectiveness analysis that specifically include considering land or subsurface disposal techniques as feasible alternatives. (Sperling-Florida)
W75-07766

CABIN CREEK, AN ACCUMULATION OF UNPAID SOCIAL AND ENVIRONMENTAL COSTS IN APPALACHIA,
Army Engineer District, Huntington, W. Va.
For primary bibliographic entry see Field 5G.
W75-07767

SGARLATA V. CITY OF SCHENECTADY (ACTION AGAINST CITY FOR FLOOD DAMAGE WHEN COFFER DAM BURST).
353 N.Y.S.2d 603 (S. Ct. Schenectady Cty. 1974).

Descriptors: *Municipal water, *Negligence, *Judicial decisions, *Flood control, *New York, Water control, Flood routing, Dams, Civil engineering, Flood damage, Hydraulic structures, Drainage systems, Flood flow, Legal aspects, Risks, Safety, Hazards, Water law, Cofferdams.
Identifiers: *Sovereign immunity.

Plaintiffs brought suit alleging damages through the negligence of the City of Schenectady in the maintenance and operation of the City's drainage system. Heavy rainfall caused the bursting of a dam which created a drainage overflow. Defendants asserted a defense of reasonable inspection and repair. The Supreme Court of New York found for the plaintiffs, holding that defendant City failed in the exercise of due care to ascertain and correct inadequacy in the drainage system. (Proctor-Florida)
W75-07768

WATER QUALITY-BASED EFFLUENT LIMITATIONS.
For primary bibliographic entry see Field 5G.
W75-07769

DISCHARGE LIMITATIONS--FEDERAL FACILITIES.
For primary bibliographic entry see Field 5G.
W75-07770

WATER REGULATIONS--WATER QUALITY STANDARDS.
For primary bibliographic entry see Field 5G.
W75-07771

WATER REGULATIONS--STATE PROGRAM ELEMENTS NECESSARY FOR PARTICIPATION IN THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM,
For primary bibliographic entry see Field 5G.
W75-07772

WATER REGULATIONS--NPDES,
For primary bibliographic entry see Field 5G.
W75-07773

WATER REGULATIONS--PREPARATION OF WATER QUALITY MANAGEMENT BASIN PLANS,
For primary bibliographic entry see Field 5G.
W75-07774

NORMATIVE ASPECTS OF SCIENTIFIC RESEARCH IN THE OCEANS, THE CASE OF MEXICO,
Rhode Island Univ., Kingston. Law of the Sea Inst.
J. A. Vargas.
Occasional Paper No 23, October 1974. 23 p, append.

Descriptors: *Sea water, *Internal waters, *Research and development, *Continental shelf, Ships, Riparian rights, Pollutants, Navigation, Fishing, Fisheries, Coasts, Oceans, Research facilities, Management.
Identifiers: *Coastal waters, *Coastal zone, Territorial seas(Jurisdiction), Territorial waters.

The Mexican government's position regarding scientific research activities conducted within its territorial seas by foreign vessels is opposed to that adopted by the highly developed countries which believe that complete freedom of scientific research in the oceans is indispensable to scientific advancement and progress. The Montevideo, Lima, Caracas and Santo Domingo meetings developed a contrary and unified position suggested by the Latin-American nations. Mexico, in particular, does not recognize innocent passage in internal waters, identifying such sections of the oceans as integral parts of the territory of the nation itself. The Mexican government considers the 12 mile territorial sea subject to its sovereign rights, except for innocent passage, and the continental shelf a part of the ocean space under its direct domain. It is also striving for legal recognition of a patrimonial sea up to two hundred miles,

and maintains that freedom to conduct marine scientific research is one of the freedoms of the high seas. At the recent 1974 Caracas Conference on Marine Scientific Research, the Mexican statement proposed that it is not possible to accept unrestricted marine scientific research without the express consent of the coastal state. It contends that the states have the right to control such activities and that once the researching state has met bona fide requirements, the coastal state should not normally withhold authorization. (Gagliardi-Florida)
W75-07775

WATER REGULATIONS--CRITERIA FOR THE EVALUATION OF PERMIT APPLICATIONS,
For primary bibliographic entry see Field 5G.
W75-07776

GROUND-WATER PROTECTION IN PENNSYLVANIA, A MODEL STATE PROGRAM,
Geraghty and Miller, Port Washington, N.Y.
For primary bibliographic entry see Field 4B.
W75-07777

THE EMERGING RIGHT OF PHYSICAL ENFORCEMENT OF FISHERIES MEASURES BEYOND TERRITORIAL LIMITS,
Wisconsin Univ., Madison. Sea Grant Program.
R. B. Bilder.
Technical Report No 22, July 1974. 28 p, 24 ref.

Descriptors: *Fish management, *International law, *Governments, *Enforcement, Regulations, Water policy, Fish populations, Fisheries, Fishing, Legal aspects, Law of the sea, International waters, Foreign waters, Foreign trade, Treaties, United Nations, Foreign countries, Water resources development, Water law.

The Caracas Law of the Sea Conference will substantially change and limit traditional concepts of freedom of fisheries on the high seas. It is predicted that the Conference will agree upon a rather narrow territorial sea; probably twelve miles and recognize broad coastal state fisheries jurisdiction. If the Conference recognizes the right of a coastal state to establish rules governing fisheries beyond its territorial seas, the question arises whether state coastal authority will embrace broad ranging enforcement power, including the right to stop, board, search and seize foreign vessels. Various enforcement alternatives are discussed in the context of the traditional law of the sea as reflected in the Geneva Convention under existing coastal state fisheries regimes, and proposals presented to the Seabed Committee preparatory to the Law of the Sea Conference. While it is likely that conflicting concerns of coastal and other states will present substantial obstacles to uniformity, enforcement processes are not unitary but can be tailored and flexibly allocated in a way acceptable to the concerned countries. (Proctor-Florida)
W75-07778

ENVIRONMENTAL CONCERN AND POLITICAL ELITES: A STUDY OF PERCEPTIONS BACKGROUNDS AND ATTITUDES,
California Univ., Davis. Inst. of Governmental Affairs.
For primary bibliographic entry see Field 6G.
W75-07779

POSSIBLE OPTIONS FOR REDUCING THE SALINITY OF THE COLORADO RIVER WATERS FLOWING TO MEXICO (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Department of State, Washington, D.C.
For primary bibliographic entry see Field 3A.
W75-07782

6F. Nonstructural Alternatives

PIMA COUNTY MOVES ON GEOLOGIC HAZARDS,
Arizona Bureau of Mines, Tucson.
H. Peirce, and J. A. Vuich.
Field Notes: From the Arizona Bureau of Mines, Vol 5, No 1, March 1975. University of Arizona, Tucson, p 1-3, 6-9. 14 fig.

Descriptors: *Arizona, *Flood protection, *Flood plains, *Groundwater recharge, *Legislation, Flood forecasting, Arid lands, Water spreading, Flood recurrence interval, Floods, Flash floods, Sheet floods, Channels, Recharge, Arroyos, Dry beds, Intermittent streams.
Identifiers: Tucson(Ariz), Pima County(Ariz), Sonoran Desert.

Pima County, Arizona, located in the Sonoran Desert, is characterized by a low rainfall and a high flood potential. This condition results from the intensity of random storms and from the high runoff from the sparsely vegetated landscape with its mountains and steep slopes. People moving into the county from other parts of the country have built housing units on the floodplains and near foothill arroyos. Periodically, such housing is threatened by erosion and occasionally destroyed. Recently, the county passed a floodplain ordinance to avoid past problems. However, the ordinance is vague and, unless enforced as part of an overall county-wide plan, could cause more problems. For example, if piecemeal development of the land continues it could lead to a demand for channelization of the arroyos and washes which in turn would achieve flood protection at the price of lowering the recharge rate of the aquifer. (Bowden-Arizona)
W75-07392

EVOLVING PATTERNS OF FLOOD PLAIN USE,
Oregon State Univ., Corvallis. Dept. of Geography.
K. W. Muckleston.
In: Land and Water Use in Oregon; Seminar conducted by Oregon State University, Spring Quarter 1974, Water Resources Research Institute, Corvallis, Oregon, p 27-44, July 1974. 4 fig, 1 tab, 26 ref.

Descriptors: *Flood plains, *Flood plain zoning, *Flood plain insurance, Non-structural alternatives, Flood damage, Insurance, Economics, Zoning, Regulation, Legal aspects, Building codes, Floodways, Dams, Riparian rights, Land use, Legislation, Flood protection, Local governments, Oregon.
Identifiers: Federal Flood Insurance Act.

Despite very large expenditures to abate flood damage, continued encroachment into riverine areas offsets these investments. In Oregon and throughout the country, present uses of the flood plains reflect their perceived advantages as sites of occupancy. Man has attempted to ensure the safe use of these riverine areas by erecting structures to control flood flows. The futility of depending almost entirely on structures was recognized by Congress in 1968 when it enacted the National Flood Insurance Program. If implemented, this program will complement the engineering approach to abating flood losses. But implementation has been slow, due largely to the value this society still places in the right of property owners to use their lands as they see fit under all but the most extradordinary circumstances. Although this view had its merits in an expanding frontier, under the present conditions it is becoming increasingly anachronistic. Evidence suggests, however, that the evolving state and federal interests in planned land management will impel local governments to more vigorously manage flood plain lands in a manner designed to achieve comprehensive, long range goals. (See also W75-07507) (Sims-ISWS)
W75-07510

ECONOMIC ANALYSIS OF FLOOD DETENTION STORAGE BY DIGITAL COMPUTER,
Kentucky Water Resources Inst., Lexington.
J. R. Villines.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-241 754, $7.50 in paper copy, $2.25 in microfiche. Research Report No. 9, 1968. 248 p, 12 fig, 22 tab, 23 ref, 2 append. OWRR A-001-KY(5). 14-01-0001-1085.

Descriptors: *Computer programs, *Flood control, Nonstructural alternatives, Floodproofing, Flood plain zoning, Flood peak, Flood routing, Planning, *Economic justification, Digital computers, Dam design, *Reservoir design, Detention reservoirs, Spillways, *Kentucky.
Identifiers: *Licking River(Ky).

The objective was to develop a digital computer procedure for preliminary analysis of the economic justification of reservoir detention storage for flood control and to present a sample study illustrating its application. A computer program called the University of Kentucky Flood Control Planning Program III was developed and tested on the flood plain of the South Fork of the Licking River in northeastern Kentucky. Given a specified reservoir site and a downstream flood plain divided into planning units, Program III selects the economically efficient combination of reservoir detention storage and the associated combination of channel improvement, flood proofing, land-use management, and residual flooding for each downstream planning unit. The program does not attempt final measure design but isolates those combinations of measures for which detailed data collection and analysis is warranted. Presented are a description of the basic Program logic and the results of its application along the South Fork, Licking River, as well as a FORTRAN IV listing of the computer program and a listing of the input data used in the South Fork, Licking River analysis.
W75-07518

WATER QUALITY CONTROL PLAN: SAN FRANCISCO BAY BASIN, CALIFORNIA,
Water Resources Engineers, Inc., Walnut Creek, Calif; and Yoder, Trotter, Orlob and Associates, Walnut Creek, Calif.
For primary bibliographic entry see Field 5G.
W75-07673

A TURNING POINT,
Department of Housing and Urban Development, Washington, D.C.
G. K. Bernstein.
Water Spectrum, Vol 6, No 2, p 8-14 (1974). 11 photo, 1 tab.

Descriptors: *Federal government, *Flood protection, *Flood damage, *Flood plain zoning, Legislation, Construction, Planning, Adoption of practices, Government finance, Engineering structures, Decision making, Budget, Water law, Social aspects, Flooding, Surface runoff.
Identifiers: *Flood Disaster Protection Act of 1973.

The Flood Disaster Protection Act of 1973 represents a turning point in the approach toward flood loss prevention. Every flood prone community in the Nation will be required to guide new construction in areas subject to flooding so as to minimize flood damage. Property owners in flood prone areas are required to purchase flood insurance as a condition of any form of federal or federally related financial assistance for acquisition or construction of buildings in identified special flood hazard areas. The legislation makes possible the eventual substitution of federal flood insurance for the current cumbersome and often inequitable system of federal disaster loans. Since 1936 more than seven billion dollars have been spent to construct flood protection works. Yet annual flood losses amount to about one and a

quarter billion dollars and are continuing to increase, largely as a result of the improper use of the Nation's flood plains. Under the Act, the Secretary of HUD is required to notify all flood prone communities in the Nation of these tentative identifications as such by July 1, 1974. The community then must either make prompt application for participation in the program or satisfy the Secretary that it is no longer flood prone. (Sperling-Florida)
W75-07765

6G. Ecologic Impact Of Water Development

ENVIRONMENTAL QUALITY AND SAFETY, VOL. 2. GLOBAL ASPECTS OF CHEMISTRY, TOXICOLOGY AND TECHNOLOGY AS APPLIED TO THE ENVIRONMENT.
Georg Thieme Publishers: Stuttgart, West Germany. Academic Press, Inc.: New York, N.Y. 333 p, Illus. Coulston, F., Korte, F. (Ed.).

Descriptors: *Environmental effects, Environment, DDT, Atmospheric pollution, Air pollution, Potable water, Waste water, Solid wastes, Inorganic chemicals, Toxicity, Pesticides, Seawater, Sediments, Fish, Fertilizers, Ecology.

Several papers discuss man in the technological age and his environment, science in the food industry, DDT-chlorophenothene, and new technologies for the alleviation of environmental pollution. Other topics include recent air pollution problems, drinking water and waste water problems, disposal and utilization of solid waste, inorganic chemicals in the environment, chemicals in the environment, toxic microelements and therapeutica in food of animal origin, power generation chemicals and toxicological evaluation of special organochlorinated compounds. Factors to be considered in evaluating the toxicity of pesticides to birds in their environment and studies on the toxicology of nitrites and cadmium content in sea water, bottom sediment, fish, lichen and elk in Finland are presented. The economics of fertilizer use by United States farmers, economic importance of chemical crop protection in relation to its ecological impact, protection of environmental quality in Israel, and retrospective and prospective aspects in the establishment of air quality guides are studied.--Copyright 1974, Biological Abstracts, Inc.
W75-07355

USE OF ENVIRONMENTAL ANALYSES ON WASTEWATER FACILITIES BY LOCAL GOVERNMENT,
Teknekron, Inc., Washington, D.C. Applied Research Div.
For primary bibliographic entry see Field 5D.
W75-07360

SOUTHWEST ENERGY STUDY. SUMMARY REPORT.
Southwest Energy Federal Task Force.
For primary bibliographic entry see Field 6B.
W75-07380

WILDLIFE, ECOLOGY, AND PLANNING IN A PROPOSED IRRIGATION DEVELOPMENT IN NORTH DAKOTA,
North Dakota State Univ., Fargo.
G. H. Cross.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-241 670, $9.50 in paper copy, $2.25 in microfiche. Ph.D. Thesis, July 1973. 222 p, 73 tab, 27 fig, 43 ref, 5 append. OWRT B-014-NDAK(1).

Descriptors: *Wildlife, *Wildlife habitats, *Wildlife conservation, *Irrigation programs, *Environmental effects, Balance of nature, Wildlife management, Habitat improvement, Shelterbelts, Carrying capacity, Windbreaks, *North Dakota, Irrigation, Irrigated land, Irrigation systems, Irrigation effects.
Identifiers: Harrison Diversion Project(NDak).

A 20,000 acre area in southeastern North Dakota will be irrigated as the first phase of the Garrison Diversion Project which will eventually irrigate 250,000 acres in central and eastern North Dakota. This study seeks to understand the impact of such land use on wildlife. Present farming practices have left a variety of odd, idle areas and shelterbelts scattered throughout the region. With the exception of the ringnecked pheasant, wildlife abounds. Irrigated agriculture will result in intensive land use. The use of sprinklers will result in a tremendous loss of wildlife habitat. The constant wetting may interfere with the nesting of some birds. Livestock forage operations will mean fall grazing of cropland; this will reduce the amount of cover and food which is important for wildlife. Soil mining (the practice of removing all grain or forage from the land) will also limit food and cover for wildlife. The problems associated with sprinkler irrigation systems are formulative and little can be done in the way of practical solutions because of the economic implications to the irrigator. The irrigated land will be almost impossible to manage for the benefit of wildlife. Any beneficial relationship between irrigation and wildlife on cultivated land will be incidental. A wildlife plan is outlined which will mitigate the negative impact of irrigated agriculture on wildlife. (Bowden-Arizona)
W75-07400

REPORT TO THE CONGRESS ON OCEAN POLLUTION, OVERFISHING, AND OFFSHORE DEVELOPMENT; JULY 1973 THROUGH JUNE 1974.
National Oceanic and Atmospheric Administration, Washington, D.C.
For primary bibliographic entry see Field 5B.
W75-07405

ENVIRONMENTAL STUDIES OF AN ARCTIC ESTUARINE SYSTEM--FINAL REPORT,
Alaska Univ., College. Marine Science Inst.
For primary bibliographic entry see Field 2L.
W75-07417

MARINE POLLUTION MONITORING: STRATEGIES FOR A NATIONAL PROGRAM,
Scripps Institution of Oceanography, La Jolla, Calif.
For primary bibliographic entry see Field 5A.
W75-07418

ENGINEERING CONSIDERATIONS FOR MARINAS IN TIDAL MARSHES,
Delaware Univ., Newark. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2L.
W75-07420

BISCAYNE BAY: ENVIRONMENTAL AND SOCIAL SYSTEMS.
Miami Univ., Coral Gables, Fla.
For primary bibliographic entry see Field 2L.
W75-07427

ENVIRONMENTAL SURVEYS IN ALASKA BASED UPON ERTS DATA,
Alaska Univ., College.
For primary bibliographic entry see Field 7B.
W75-07486

THE PRACTICAL LIMITS OF POLLUTION CONTROL TECHNOLOGY,
Oregon State Univ., Corvallis. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5G.
W75-07508

ENVIRONMENTAL MANAGEMENT IN THE COLORADO RIVER BASIN.
For primary bibliographic entry see Field 6B.
W75-07525

BASIN-WIDE PLANNING AND THE PROBLEM OF MULTIPLE JURISDICTIONS,
Ferris, Weatherford and Brennan, San Diego, Calif.
For primary bibliographic entry see Field 6E.
W75-07526

THE ROLE OF ENVIRONMENTAL INDICES IN REGIONAL MANAGEMENT,
Resources for the Future, Inc., Washington, D.C.
For primary bibliographic entry see Field 6B.
W75-07528

FUTURE DIRECTIONS IN ENVIRONMENTAL LEGISLATION,
For primary bibliographic entry see Field 6E.
W75-07532

STRATEGIES FOR ENVIRONMENTAL PLANNING IN THE UPPER COLORADO RIVER REGION,
California Univ., Berkeley. Dept. of Landscape Architecture.
For primary bibliographic entry see Field 6B.
W75-07534

URBANIZATION WITH OR WITHOUT ENVIRONMENTAL QUALITY,
United States International Univ., San Diego, Calif.
For primary bibliographic entry see Field 4C.
W75-07542

ENERGY FROM COAL: GUIDELINES FOR THE PREPARATION OF ENVIRONMENTAL IMPACT STATEMENTS,
Battelle Columbus Labs., Ohio.
M. L. Warner, R. C. Burke III, G. I. Nehman, G. A. Watkins, and S. Chatterjee.
Final Report to Department of the Interior, Office of Research and Development, April 30, 1975, 338 p. 14-01-0001-1933.

Descriptors: *Environmental effects, *Coals, *Energy, Mining, Economic impact, Social impact, Energy conversion, *Standards, *Research and development, Federal Government, Methodology, Alternative planning, Water quality, Groundwater, Surface water, Water utilization.
Identifiers: *Environmental Impact Statements, *Coal energy, Surface water quantity.

A comprehensive approach is presented to the preparation of environmental impact statements (EIS) on coal energy related R and D proposals. The material is organized into chapters paralleling the required EIS content points, as specified in Department of Interior guidelines. Additional chapters discuss methods of summarizing major environmental impact statements to facilitate communication to the public, and remaining research and data needs of the environmental assessment process. Guidance is offered for measuring a comprehensive set of potential physical environment, economic, and social impacts. The analysis is organized according to a hierarchy of broad impact issues, more specific aspects of the environment, and very specific measurable indices. Though much of the material presented is applicable to most coal energy related projects, coal R and D projects are of particular concern, with special techniques suggested for dealing with the unique impact assessment problems of R and D activities.

These techniques include procedures for identifying and describing the impacts of subsequent R and D steps, and for identifying, organizing, and comparing a comprehensive set of project alternatives. A special section of one chapter considers the impact of water on proposed projects, discussing factors concerned with surface water quantity, groundwater quantity and water quality.
W75-07590

DEVELOPMENT OF AN APPROACH TO IDENTIFICATION OF EMERGING TECHNOLOGY AND DEMONSTRATION OPPORTUNITIES,
Battelle Columbus Labs., Ohio.
For primary bibliographic entry see Field 5G.
W75-07617

PROCEEDINGS OF A CONFERENCE ON MANAGEMENT OF DREDGE ISLANDS IN NORTH CAROLINA ESTUARIES,
North Carolina Univ., Wilmington. Dept. of Biology.
For primary bibliographic entry see Field 2L.
W75-07716

HUMAN ECOLOGY AND THE ECOSYSTEM, (IN JAPANESE),
Institute of Population Problems, Tokyo (Japan).
N. Makoto.
Annu Rep Inst Popul Probl. Vol 17, p 70-73, 93-94. 1972, English summary.

Descriptors: *Social aspects, *Ecosystems, Social values, Environment.

Environmental problems demand a sociological theory capable of dealing with socio-environmental relationships. As a clue for understanding socio-environmental system Otis Dudley Duncan's ecosystem theory is explained. The contents of Duncan's theory follows: In order to deal with the close connection between social organization and environment, sociology must adopt a concept of ecosystem which is capable of covering broader phenomena in comparison with the concept of social system. The ecosystem is a system which is composed of 4 functionally interrelated components, i.e., population, environment, technology and social organization. In the ecosystem there are flows of 3 elements, i.e., material, energy and information, and, among these elements, information has the greatest significance for the ecosystem including the human species. Social evolution in the ecosystem can be explained by the expansion of the niches of human species, that is 'ecological expansion'. Human expansion in the ecosystem has been made possible by the subsystem of information-cumulation and application of human society. The modern stage of social evolution is called 'industrial-urban societies.' The ecological expansion in this stage is summarized into 4 interdependent facts: the accelerated cumulation of technology, the intensification of environmental development, population explosion and organizational revolution. The merit of Duncan's theory is that it adopts a comprehensive conceptual system (ecosystem) including physical environmental as an 'internal variable' and makes sociology able to deal with a socio-environmental system in principle.--Copyright 1973, Biological Abstracts, Inc.
W75-07750

NELSON V. BUTZ (ACTION SEEKING INJUNCTION AND DECLARATORY RELIEF RELATING TO CONSTRUCTION OF PROPOSED DAM).
For primary bibliographic entry see Field 6E.
W75-07757

CABIN CREEK, AN ACCUMULATION OF UNPAID SOCIAL AND ENVIRONMENTAL COSTS IN APPALACHIA,
Army Engineer District, Huntington, W. Va.
For primary bibliographic entry see Field 5G.
W75-07767

ENVIRONMENTAL CONCERN AND POLITICAL ELITES: A STUDY OF PERCEPTIONS BACKGROUNDS AND ATTITUDES,
California Univ., Davis. Inst. of Governmental Affairs.
E. Costantini, and K. Hanf.
Research Report No 21, May 1971. 40 p, 31 ref, 16 tab. OWRT A-037-CAL(1).

Descriptors: *Decision making, *Political constraints, *Political aspects, *Governments, Environment, Environmental effects, Water resources development, Regiok s Institutions, Area redevelopment, Administration, Pollutants, Governmental interrelations, Habitats, Social aspects, Water law, Regions.

Inevitably the question of what constitutes unacceptable environmental conditions is a political one. Environmental policy is not an irresistible, simple, unchallenged response to empirical or scientific fact alone, but is determined through trial by political combat. Environmental policy tends to be a function of the degree of concern for environmental problems on the part of those persons in a position to make or affect relevant decisions. The decision makers in the Latke Tahoe Basin are examined in terms of variations in their level of concern for environmental problems. The relationship between these variations and other environmental perceptions, the background, and political, social and psychological attitudes of the decision makers is discussed. A larger study is concerned with identifying and analyzing the attitudes and interests of the most significant actors concerned with environmental policy in the Lake Tahoe Basin. (Proctor-Florida)
W75-07779

BEACH EROSION CONTROL IMPROVEMENTS, WAIKIKI BEACH, OAHU, HAWAII (KAPAHULU STORM DRAIN TO THE ELKS CLUB) (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Corps of Engineers, Honolulu, Hawaii. Pacific Ocean Div.
For primary bibliographic entry see Field 8A.
W75-07780

GEOTHERMAL LEASING PROGRAM, VOL IV, APPENDIX I, COMMENTS ON DRAFT IMPACT STATEMENT AND PROPOSED REGULATIONS (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Department of the Interior, Washington, D.C.
For primary bibliographic entry see Field 8B.
W75-07781

POSSIBLE OPTIONS FOR REDUCING THE SALINITY OF THE COLORADO RIVER WATERS FLOWING TO MEXICO (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Department of State, Washington, D.C.
For primary bibliographic entry see Field 3A.
W75-07782

FORT LAUDERDALE, FLORIDA (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Environmental Protection Agency, Atlanta, Ga. Region IV.
For primary bibliographic entry see Field 5D.
W75-07783

MAINTENANCE OF BAY RIDGE AND RED HOOK CHANNELS, NEW YORK NAVIGATION PROJECT (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Army Engineer District, New York.
For primary bibliographic entry see Field 8A.
W75-07784

THE MENDOTA WATERSHED PROJECT, LASALLE AND BUREAU COUNTIES, ILLINOIS (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Soil Conservation Service, Champaign, Ill.
For primary bibliographic entry see Field 4D.
W75-07785

RESEARCH DEMONSTRATION PILOT STUDY OF MUNICIPAL WASTE COMPOSTING (FINAL ENVIRONMENTAL STATEMENT),
Agricultural Research Service, Washington, D.C.
For primary bibliographic entry see Field 5D.
W75-07786

NORTH BROWARD COUNTY, FLORIDA (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Environmental Protection Agency, Atlanta, Ga. Region IV.
For primary bibliographic entry see Field 5D.
W75-07787

PEACOCK CREEK, LIBERTY COUNTY, GEORGIA (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Army Engineer District, Savannah, Ga.
For primary bibliographic entry see Field 4A.
W75-07788

UPPER SALT CREEK WATERSHED, COOK, LAKE AND DUPAGE COUNTIES, ILLINOIS (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Soil Conservation Service, Washington, D.C.
For primary bibliographic entry see Field 8A.
W75-07789

7. RESOURCES DATA

7A. Network Design

STREAM GAGING INFORMATION, AUSTRALIA -- SUPPLEMENT 1973.
Australian Water Resources Council, Canberra.
For primary bibliographic entry see Field 7C.
W75-07480

A NOTE ON COSTS OF COLLECTING HYDROMETRIC FLOW DATA IN THE UNITED STATES,
Geological Survey, Reston, Va.
W. B. Langbein, and G. E. Harbeck, Jr.
Hydrological Sciences Bulletin, Vol 19, No 2, p 227-229, June 1974.

Descriptors: *Basic data collections, *Hydrologic data, *Costs, Cost-benefit analysis, Gaging stations, Stream gages, Hydrometry, Water measurement, Streamflow.
Identifiers: *Hydrometric data.

The hydrometric program in the United States consists of 8400 full-record stations and an equal number of partial-record stations operated by 47 district offices. A sampling of four districts selected to represent the range of hydrometric conditions in the country indicated that costs (in 1972) for installation of a full-record station intended for indefinite terms of operation ranged between $5000 and $10,000. Short-term stations range between $2500 and $4000. Costs of operation for full-record stations ranged between $800 and

$1250 per year, whereas office costs for processing the record ranged between $500 and $1250. A considerable emphasis is given in the program to partial-record stations designed to furnish specific information for floods and droughts. Annual costs in terms of full-record stations range from only 5 percent for a low-flow station, 15-20 percent for a crest-stage record, to 50 percent for a flood-hydrogram station. Publication costs average about $7 per page. This small sample survey shows considerable variations and even greater variations might be expected internationally. In any case, differences in costs nationally or internationally invite proper inquiry as to causes in the search for economy. (Knapp-USGS)
W75-07578

7B. Data Acquisition

AUTOMATED ANALYSIS OF INDIVIDUAL REFRACTORY ORGANICS IN POLLUTED WATER,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5A.
W75-07404

POTENTIAL VALUE OF EARTH SATELLITE MEASUREMENTS TO OCEANOGRAPHIC RESEARCH IN THE SOUTHERN OCEAN,
National Environmental Satellite Service Washington, D.C.
For primary bibliographic entry see Field 2C.
W75-07421

A COMPARISON OF INFRARED IMAGERY AND VIDEO PICTURES IN THE ESTIMATION OF DAILY RAINFALL FROM SATELLITE DATA,
National Environmental Satellite Service, Washington, D.C.
For primary bibliographic entry see Field 2B.
W75-07422

SNOW DEPTH AND SNOW EXTENT USING VHRR DATA FROM THE NOAA-2 SATELLITE,
National Environmental Satellite Service, Washington, D.C.
For primary bibliographic entry see Field 2C.
W75-07423

AN INEXPENSIVE MULTIPLE LEVEL WATER SAMPLER,
Toronto Univ. (Ontario). Dept. of Zoology.
M. H. Goodwin, and C. I. Goddard.
Journal of the Fisheries Research Board of Canada, Vol 31, No 10, p 1667-1668, October 1974. 1 fig.

Descriptors: *Water sampling, *Equipment, On-site investigations, *Sampling, Salinity, Dissolved oxygen, Water levels.
Identifiers: *Water samplers(Multiple level).

An inexpensive nonmetallic water sampler was designed to secure multiple samples simultaneously from different depths. The device is constructed of readily available materials and may be operated from a small boat. The sample bottle is constructed from a length of ABS drain pipe to which a nylon rope bridle is attached with plastic tape. Two rubber balls are attached to a piece of laboratory tubing passed through the pipe. Before tying, the tubing is stretched so that the balls will make a tight seal at the ends of the pipe. The desired number of sample bottles are then attached to a braided polypropylene line tied to a 25-kg weight. To prepare the units for sampling, the opposing balls are brought together at the midpoint of the pipe and the brass rings are tied together with a slip knot. All the pairs of balls are tied with the same nylon line, so that, when the end of the trip line is pulled, all knots collapse in sequence and the balls seal the pipes. (Sims-ISWS)
W75-07455

SATELLITE-TRACKED CUMULUS VELOCITIES,
Chicago Univ., Ill.
T. T. Fujita, E. W. Pearl, and W. E. Shenk.
Journal of Applied Meteorology, Vol 14, No 3, p 407-413, April 1975. 9 fig, 2 tab, 9 ref. NOAA Grant E-198-68G, NASA Grant NGR 14-001-008, NSF Grant GA-31589.

Descriptors: *Winds, *Clouds, *Satellites(Artificial), Entrainment, Evaluation, Movement, Wind velocity, Estimating, Velocity, *Remote sensing.
Identifiers: Standard deviation, *Cloud velocity, *Cumulus, Wind estimates, Updrafts, Downdrafts.

Velocities of tracer clouds have been computed by NOAA, NASA, Stanford Research Institute, University of Wisconsin, University of Chicago, and others. Despite the fact that their methods and inherent computation speeds are different from each other, the present state-of-the-art permits the computations with 1 m/s speed and 4 degrees direction in standard deviation. Such an accuracy in the cloud velocity is satisfactory for most practical purposes. The research presented warns that we have to exercise extreme caution in converting cloud velocities into winds. The motion of fair-weather cumuli obtained by tracking their shadows over Springfield, Missouri, revealed that the standard deviation in the individual cloud motion is several times the tracking error. Analysis of whole-sky images obtained near Tampa, Florida, failed to show significant continuity and stability of cumulus plumes, less than 0.3 mi in diameter. Cumulus turrets 0.3 to 2 mi in size appear to be the best target to infer the mean wind within the sub-cloud layers. The addition and deletion of turrets belonging to a specific cell appear to be the cause of the erratic motion of a tracer cell. It was concluded that the accuracy of wind estimates is unlikely to be better than 2 m/s unless the physical and dynamical characteristics of cumulus motion is further investigated. (Jones-ISWS)
W75-07458

A NEW HOT-WIRE LIQUID CLOUD WATER METER,
National Hurricane Research Lab., Coral Gables, Fla.
For primary bibliographic entry see Field 2B.
W75-07461

USE OF AXISYMMETRIC INFILTRATION MODEL AND FIELD DATA TO DETERMINE HYDRAULIC PROPERTIES OF SOILS,
Utah State Univ., Logan. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2G.
W75-07466

TEMPERATURE MEASUREMENTS IN THE UPPER 10 M WITH MODIFIED EXPENDABLE BATHYTHERMOGRAPH PROBES,
Woods Hole Oceanographic Institution, Mass.
J. G. Bruce, and E. Firing.
Journal of Geophysical Research, Vol 79, No 27, p 4110-4111, September 20, 1974. 2 fig, 3 ref. NSF Grant GX-29051.

Descriptors: *Temperature, *Sea water, *Thermal stratification, Diffusion, Heat balance, Oceans, Oceanography, Stratification, Measurement, Surface waters, Bathythermographs, Distributions, *Atlantic Ocean.
Identifiers: Bermuda, Heat loss rate.

Observations southwest of Bermuda with modified expendable bathythermographs (XBT) of surface warming and cooling during an isolated windless day with strong insolation showed the development and, by evening, the disappearance of a shallow 1- to 2-m layer that was 2-3C warmer than the main mixed layer. (Lee-ISWS)
W75-07475

BOTTOM CURRENT MEASUREMENTS IN THE LABRADOR SEA,
Lamont-Doherty Geological Observatory, Palisades, N.Y.
For primary bibliographic entry see Field 2L.
W75-07478

THIRD EARTH RESOURCES TECHNOLOGY SATELLITE SYMPOSIUM, VOLUME II, SUMMARY OF RESULTS.
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
Symposium held at Washington, D.C., December 10-14, 1973: NASA SP-356, May 1974. 179 p, append. Freden, S.C., Mercanti, E.P., and Friedman, D.B., editors.

Descriptors: *Remote sensing, *Satellites(Artificial), *Mapping, *Surveys, Cloud cover, Environment, Land use, Geology, Geological mapping, Oil wells, Exploration, Sedimentation, Fish, Strip mines, Waterfowl, Agriculture, Water resources, Data collections, Data processing.
Identifiers: *ERTS.

This symposium was the third in a series on the significant results obtained from the first Earth Resources Technology Satellite (ERTS-1). The Thursday Summary Session was designed to highlight and summarize the significant results from the first three days and also to present some typical examples of the applications of ERTS data for solving resources management problems at the national, state, and local levels. The presentations from this session are contained in Volume II of the Proceedings. The papers were grouped under the following headings: (1) selected significant accomplishments, (2) applications and key findings, and (3) summaries in selected disciplines. (See W75-07485 thru W75-07496) (Sims-ISWS)
W75-07484

REPORT ON THE CANADIAN ERTS PROGRAM,
Canada Centre for Remote Sensing, Ottawa (Ontario).
For primary bibliographic entry see Field 7C.
W75-07485

ENVIRONMENTAL SURVEYS IN ALASKA BASED UPON ERTS DATA,
Alaska Univ., College.
J. M. Miller.
In: Third Earth Resources Technology Satellite Symposium, Vol II, Summary of Results, Washington, D.C., December 10-14, 1973: NASA SP-356, p 12-40, May 1974. 37 fig.

Descriptors: *Remote sensing, *Satellites(Artificial), *Alaska, Environment, Land use, Pipelines, Highways, Vegetation, Agriculture, Ice cover, Snow cover, Faults(Geologic), Fractures(Geologic), Magnetic studies, Glaciers, Water circulation, Sedimentation, Wildlife.
Identifiers: *ERTS, Stream icing, Lineations.

ERTS imagery is being used to map native vegetation types in Alaska to provide a guide for agricultural land inventories. ERTS data have about a 10:1 or 20:1 cost advantage over conventional aerial photography techniques for planning the best use of specific parcels of land. Stream icing has been studied with use of ERTS data. The effects of roads on snow cover melting have been measured. Magnetic anomalies have been related to

areas of lineations visible in ERTS photos. A regional ERTS mosaic of the Denali Fault in Alaska and Canada has provided corroborative evidence of a massive offset some 400 km in length along the fault. Knowledge of circulation and sedimentation in the Cook Inlet has been improved through the use of ERTS data. ERTS data have been used to map the previously unknown distribution of habitats favored by certain marine mammals. (See also W75-07484) (Sims-ISWS)
W75-07486

GEOLOGIC EVALUATION AND APPLICATIONS OF ERTS-1 IMAGERY OVER GEORGIA,
Georgia State Geological Survey, Atlanta.
S. M. Pickering, and R. C. Jones.
In: Third Earth Resources Technology Satellite Symposium, Vol II, Summary of Results, Washington, D.C., December 10-14, 1973: NASA SP-356, p 41-49, May 1974. 12 fig.

Descriptors: *Remote sensing, *Satellites(Artificial), *Geology, Geologic mapping, *Georgia, Southeast U.S., Faults(Geologic), Folds(Geologic), Structural geology, Mining, Water resources, Wetlands, Marshes, Topography.
Identifiers: *ERTS.

Geologic mapping and mineral exploration by conventional methods are very difficult in Georgia. Thick soil cover and vegetation cause outcrops of bedrock to be small, rare, and obscure. ERTS imagery, and remote sensing in general, has helped delineate major tectonic boundaries, lithologic contacts, foliation trends, topographic lineaments, and faults. Satellite imagery and other remote sensing tools and techniques have provided a powerful tool to assist geologic research; significantly increased the mapping efficiency of field geologists; shown new lineaments associated with known shear and fault zones; delineated new structural features; provided a tool to reevaluate tectonic history; helped to locate potential groundwater sources and areas of aquifer recharge; defined areas of geologic hazards; shown areas of heavy siltation in major reservoirs; and, by close interval repetition, aided in monitoring surface mine reclamation activities and the environmental protection of the intricate marshland system. (See also W75-07484) (Sims-ISWS)
W75-07487

AN EVALUATION OF THE SUITABILITY OF ERTS DATA FOR THE PURPOSES OF PETROLEUM EXPLORATION,
Earth Satellite Corp., Washington, D.C.
J. R. Everett, and G. Petzel.
In: Third Earth Resources Technology Satellite Symposium, Vol II, Summary of Results, Washington, D.C., December 10-14, 1973: NASA SP-356, p 50-61, May 1974. 16 fig.

Descriptors: *Remote sensing, *Satellites(Artificial), Geology, *Oil, Oil fields, Oil wells, Exploration, Oil industry, Geologic formations, Oil reservoirs, Sedimentary rocks, Crystalline rocks, Costs, Economics, *Oklahoma, Data collections, Data processing, *Texas.
Identifiers: *ERTS, *Anadarko Basin(Okla-Tex).

The Anadarko Basin lies in western Oklahoma and the panhandle of Texas. It was chosen as a test site because there is a great deal of published information available on the surface and subsurface geology of the area, there are many known structures that act as traps for hydrocarbons, and it is similar to several other large epicontinental sedimentary basins. MSS bands 5 and 7 together showed the greatest versatility and widest range of easily extractable information. Interpretation of ERTS imagery defined the major features of the Anadarko Basin and refined the understanding of many smaller areas within the test site. The general features of the basin can be inferred from analysis of the interpreted lithologic distribution. ERTS imagery is an excellent tool for reconnaissance exploration of large sedimentary basins or new exploration provinces. The imagery allows rapid interpretation of large features and quickly focuses attention on anomalous areas. Because of a variety of options available for obtaining reconnaissance geological and geophysical data, cost comparisons are difficult. Moreover, the types of data obtained by ERTS and that obtained by a standard program are not precisely comparable. Based on preliminary analysis, savings produced by incorporating ERTS into an exploration program might be 20 to 50% of the cost of a standard survey. The savings would be made primarily by reducing the amount of seismic and other geophysical surveys needed. (See also W75-07484) (Sims-ISWS)
W75-07488

ERTS PROGRAM OF THE U.S. ARMY CORPS OF ENGINEERS,
Corps of Engineers, Washington, D.C.
For primary bibliographic entry see Field 7C.
W75-07489

A REVIEW OF INITIAL INVESTIGATIONS TO UTILIZE ERTS-1 DATA IN DETERMINING THE AVAILABILITY AND DISTRIBUTION OF LIVING MARINE RESOURCES,
National Aeronautics and Space Administration, Bay Saint Louis, Miss. Earth Resources Lab., and National Marine Fisheries Service, Bay Saint Louis, Miss. Fisheries Engineering Lab.
W. H. Stevenson, A. J. Kemmerer, B. H. Atwell, and P. M. Maughan.
In: Third Earth Resources Technology Satellite Symposium, Vol. II, Summary of Results, Washington, D.C., December 10-14, 1973: NASA SP-356, p 76-86, May 1974. 9 fig, 2 tab, 9 ref.

Descriptors: *Remote sensing, *Satellites(Artificial), *Fish, Commercial fish, Marine fish, Fish behavior, Fisheries, Aerial photography, Monitoring, Mississippi, Data processing, Data collections, Analysis.
Identifiers: *ERTS, Menhaden, *Mississippi Sound(Miss).

The ERTS multispectral scanner band-5 imagery of August 7, 1972, was correlated with menhaden distribution patterns. A portion of this imagery was analyzed, based on surface measurements obtained on the same date. The imagery was analyzed by superimposing on it the locations of 23 photographically detected menhaden schools. Water imagery density was divided into two density ranges. All of the menhaden schools were found to lie in the less dense ranges of the imagery. These density levels were shown to correlate significantly with measurements of water transparency and depth. These parameters were also shown to correlate with menhaden distribution. Results of the analysis clearly demonstrated the feasibility of using data from environmental sensors aboard satellites to predict fish distribution under at least one set of conditions. (See also W75-07484) (Sims - ISWS)
W75-07490

AUTOMATED STRIP MINE AND RECLAMATION MAPPING FROM ERTS,
Ohio State Univ., Columbus.
W. A. Pettyjohn, R. H. Rogers, and L. E. Reed.
In: Third Earth Resources Technology Satellite Symposium Vol II, Summary of Results, Washington, D.C., Dec 10-14, 1973: NASA SP-356, p 87-101, May 1974. 22 fig, 2 tab.

Descriptors: *Remote sensing, *Satellites(Artificial), *Strip mines, Surveys, Data processing, Mapping, Automation, Strip mine wastes, Acidic water, Spoil banks, Erosion, Reclamation, *Ohio.
Identifiers: *ERTS, Strip mine reclamation, Muskingum County(Ohio).

Local, state and federal agencies must have repetitive coverage of mining areas and the capability for rapidly evaluating each situation. They must also be able to quickly determine areas of mining reclamation and progress or viability of replanted vegetation, at least on an annual basis. At present, this cannot be done economically by ground teams and aerial photographs rapidly become outdated. Although several specific areas have been examined, a very large mine in southeastern Muskingum County, Ohio, was chosen for detailed examination. Computer compatable tapes of ERTS-1 data were used as input to an automated procedure for classifying land conditions. The target classifications included stripped earth and major areas of erosion, partially reclaimed earth and minor areas of erosion, vegetation, deep (or clear) water, shallow (or turbid) water, and unclassified areas. Aerospace technology provides a ready and efficient means of monitoring strip mine operations. It also provides a technical base for decisions regarding environmental safeguards. Some months ago, Ohio let a contract to map the eastern third of the state by using aerial photography. The aerial photographic maps are to be used to develop, among other things, strip mine and reclamation maps. By using conventional techniques it will require many months or perhaps more than a year to adequately compile the information. By using ERTS data and computer processing, however, maps showing the same themes could be generated in a matter of days. It was estimated that a comparable mapping project, including field work, computer processing, and report preparation would cost only one-tenth as much. (See also W75-07484) (Sims-ISWS
W75-07491

UTILITY OF ERTS FOR MONITORING THE BREEDING HABIT OF MIGRATORY WATERFOWL,
Environmental Research Inst. of Michigan, Ann Arbor.
E. W. Work, Jr., D. S. Gilmer, and A. T. Klett.
In: Third Earth Resources Technology Satellite Symposium, Vol II, Summary of Results, Washington, D.C., December 10-14, 1973: NASA SP-356, p 102-115, May 1974. 13 fig, 13 ref.

Descriptors: *Remote sensing, *Satellites(Artificial), *Waterfowl, *Habitats, Surveys, Wildlife, Lakes, Ponds, Ducks(Wild), Migratory birds, Mallard duck, Population, Breeding, Data processing, Analytical techniques, United States, Canada.
Identifiers: *ERTS.

Waterfowl breeding-ground surveys conducted twice each year by the Bureau of Sport Fisheries and Wildlife extend over a vast region of the United States and Canada. Data from these surveys are used to estimate waterfowl production by means of a mathematical model. Counts of May and July ponds are some of the variables used in this model. Annual production estimates are used to predict fall flights of ducks. This information is then used for establishing waterfowl hunting regulations. Work to date indicates that satellite remote sensing techniques hold considerable promise for the accurate and rapid assessment of waterfowl breeding habitat, especially changes in pond numbers and distribution. Development of an operational system utilizing satellite sensors as a primary source of data appears to be a realistic goal for the future. (See also W75-07484) (Sims-ISWS)
W75-07492

AGRICULTURE, FORESTRY, RANGE RESOURCES,
National Aeronautics and Space Administration, Houston, Tex., Lyndon B. Johnson Space Center.
For primary bibliographic entry see Field 7C.
W75-07493

WATER RESOURCES,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
V. V. Salomonson.
In: Third Earth Resources Technology Satellite Symposium, Vol II, Summary of Results, Washington, D.C., December 10-14, 1973: NASA SP-356, p 126-137, May 1974. 20 fig.

Descriptors: *Remote sensing, *Satellites(Artificial), *Water resources, Surveys, Mapping, Watersheds(Basins), Snow cover, Lake ice, Glaciers, Surface waters, Flood plains, Wetlands, Sediments, Data processing.
Identifiers: *ERTS.

The ingredient in the ERTS-1 system that has helped to provide a fundamental advance in the monitoring of water resources is the regular repetitive coverage capability. Agreement between the ERTS-1 snow cover estimates and operational aircraft surveys is normally within 5%. In addition, the snowline or the edge of the area of significant snow cover can be mapped as precisely from ERTS as from aircraft data. The cost of acquiring and analyzing cover information in several drainage basins in the West, with use of light aircraft data, was found to be approximately two orders of magnitude larger than that required when using ERTS-1 data. ERTS-1 data continue to provide glaciologists with exciting observations as to the location, extent, and character of glaciers and their surface features. With ERTS data it is possible to see the snowlines on the glaciers, which can then be related to the mass balance of the glaciers. Several ERTS-1 images have been obtained over the Great Lakes where it has become evident that ERTS-1 provides relatively high detail, synoptic views of the ice cover on these lakes. ERTS-1 has continued to show applicability for regional surveys of flood-related features. Relative variations in water quality are dramatically illustrated in ERTS-1 imagery. There are some quantitative indications that ERTS-1 data can be used to estimate sediment load. Several investigators have utilized the ERTS data collection system in water resources monitoring and in all cases they have found that it provides excellent and reliable data in various parts of the country in near-real time. (See also W75-07484) (Sims-ISWS)
W75-07494

LAND USE AND MAPPING,
National Aeronautics and Space Administration, Bay Saint Louis, Miss., Earth Resources Lab.
A. T. Joyce.
In: Third Earth Resources Technology Satellite Symposium, Vol II, Summary of Results, Washington, D.C., December 10-14, 1973: NASA SP-356, p 138-146, May 1974. 10 fig.

Descriptors: *Remote sensing, *Satellites(Artificial), *Land use, *Mapping, Land classification, Planning, Urbanization, Photogrammetry, Maps, Aerial photography, Data processing.
Identifiers: *ERTS.

The ERTS program has provided data that can be used to derive information on the actual use of the land resource, in a practical and timely manner. ERTS data provide coverage of total land areas, and its repetitive nature enables the detection and monitoring of changes taking place in land use. Generally, the techniques and the procedures used to extract information from ERTS data may be categorized as pertaining to either the interpretations of ERTS imagery or to the use of digital data and computer techniques. Examples of the use of these techniques were presented. An example of a cartographic application of ERTS was also presented. There was more detail in a U-2 photomap than in the ERTS image map, but cost estimates showed that the ERTS map can be produced for one-tenth the cost of producing the U-2 photomap. (See also W75-07484) (Sims-ISWS)
W75-07495

MINERAL RESOURCES, GEOLOGICAL STRUCTURES, AND LANDFORM SURVEYS,
National Aeronautics and Space Administration, Greenbelt, Md., Goddard Space Flight Center.
N. M. Short.
In: Third Earth Resources Technology Satellite Symposium, Vol II, Summary of Results, Washington, D.C., December 10-14, 1973: NASA SP-356, p 147-167, May 1974. 22 fig, 1 tab.

Descriptors: *Remote sensing, *Satellites(Artificial), *Geologic mapping, Surveys, Geology, Monitoring, Mapping, Structural geology, Mining, Earthquakes, Rocks, Data collections, Data processing, Mineralogy.
Identifiers: *ERTS.

ERTS results in geology have shifted to an emphasis on effective applications with economic benefits and clearcut relevance to national needs. ERTS has contributed significantly to the upgrading of geologic maps. Seasonal changes in vegetation have been found to be helpful in defining and separating units for mapping purposes. Many of the small-scale maps of the world often have extensive inaccuracies. ERTS imagery has been found useful in correcting these errors. Studies of linears have revealed previously unknown faults, and have suggested the locations of likely places to explore for ore deposits and for groundwater resources. In rock identification, ERTS data have generally proved unreliable. The most promising technique consists of rationing pairs of MSS bands and reproducing images or computer printouts from the ratio signals. ERTS data have aided in locating the portions of a mining region where the probability of roof collapse is greatest. (See also W75-07484) (Sims-ISWS)
W75-07496

THIRD EARTH RESOURCES TECHNOLOGY SATELLITE SYMPOSIUM, VOLUME III, DISCIPLINE SUMMARY REPORTS,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
For primary bibliographic entry see Field 7C.
W75-07497

AGRICULTURE, FORESTRY, RANGE RESOURCES,
National Aeronautics and Space Administration, Houston, Tex., Lyndon B. Johnson Space Center.
For primary bibliographic entry see Field 7C.
W75-07498

LAND USE AND MAPPING,
National Aeronautics and Space Administration, Bay, Saint Louis, Miss. Earth Resources Lab.
A. T. Joyce.
In: Third Earth Resources Technology Satellite Symposium, Vol III, Discipline Summary Reports, Washington, D.C., December 10-14, 1973: NASA SP-357, p 15-32, May 1974. 25 ref, 3 append.

Descriptors: *Remote sensing, *Satellites(Artificial), *Land use, *Mapping, Land classification, Urbanization, Planning, Photogrammetry, Maps, Data collections, Data processing.
Identifiers: *ERTS.

Interpretation of multispectral scanner (MSS) imagery and computer-implemented classifications with MSS digital data on tapes are the two principal interpretative techniques utilized for land use classification and inventory. Surface features covering 8000 to 20,000 sq m (2 to 5 acres) have been identified, but no consistency in identification and measurement is reported below 40,000 sq m (10 acres), and minimum-sized unit area delineation of 160,000 sq m (40 acres) or larger is most common. The results of land use classifications are usually presented by recording the identification and classification of various uses of land on a format with geographical reference. Special purpose and selected area classifications in urban areas have not achieved the desired success in identification and measurement, but some data processing techniques that are not yet fully operational promise better results. ERTS images can be successfully transformed into experimental monochromatic cartographic products of standard accuracy at 1:250,000 and smaller scales in standard map format. Because of ERTS' ability to record information for a very large region during a minimum time interval, such a system can produce basic data that eliminate the discrepancies resulting from extending the collection process over long time periods as is required with aerial images. The system allows more frequent information so that changes that indicate trends in conditions can be quickly spotted and corrective action istituted when required. The broad coverage allows photomapping of large areas almost instantaneously. (See also W75-07497) (Sims-ISWS)
W75-07499

MINERAL RESOURCES, GEOLOGICAL STRUCTURE, AND LANDFORM SURVEYS,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
For primary bibliographic entry see Field 7C.
W75-07500

WATER RESOURCES,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
V. V. Salomonson.
In: Third Earth Resources Technology Satellite Symposium, Vol III, Discipline Summary Reports, Washington, D.C., December 10-14, 1973: NASA SP-357, p 52-82, May 1974. 1 tab, 34 ref, 2 append.

Descriptors: *Remote sensing, *Satellites(Artificial), *Water resources, Watersheds(Basins), Surveys, Mapping, Snow cover, Lake ice, Glaciers, Surface waters, Rivers, Flood plains, Water quality, Estuaries, Wetlands, Irrigation, Evapotranspiration, Groundwater, Soil moisture.
Identifiers: *ERTS.

The synoptic coverage of ERTS imagery permits fairly easy identification of basin extent and broad physiographic features such as drainage area, stream network character, land use, and water coverage. It is relatively easy to identify snow by using ERTS-1 MSS bands 4 and 5. Glaciers are readily observed in the ERTS imagery. Recognizable glacial features include cirques, terminal moraines, and crevassed areas. Surging glaciers can easily be distinguished from their characteristic wiggly folded moraines. Surface water is one of the most easily delineated parameters in the hydrologic cycle. Flood plain features such as natural and artificial levee systems, upland boundaries, vegetation and soil differences, flood alleviation measures, and land use and argicultural patterns are easily identified through tonal differences on ERTS-1 color composites. Indications of water quality can be observed in a limited manner through the use of ERTS-1 imagery in bands 4 and 5. Areas covered by wetlands can be measured by a variety of techniques. The presence of irrigation methods is best identified in the arid and semiarid regions of the United States with ERTS-1. Since groundwater or subsurface water cannot be seen directly from ERTS imagery, its presence must be inferred from identification of surface features that are generally correlated with or are an indication of subsurface water. Relative variations of soil moisture in unvegetated or baresoil areas can be seen. (See also W75-07497) (Sims-ISWS)
W75-07501

MARINE RESOURCES,
National Aeronautics and Space Administration, Bay, Saint Louis, Miss., Earth Resources Lab.

E. L. Tilton, III.
In: Third Earth Resources Technology Satellite Symposium, Vol III, Discipline Summary Reports, Washington, DC, December 10-14, 1973: NASA SP-357, p 83-106, May 1974. 1 tab, 12 ref, 2 append.

Descriptors: *Remote sensing, *Satellites(Artificial), *Oceanography, Meteorology, Marine biology, Turbidity, Chlorophyll, Sea ice, Lake ice, Fish, Aquatic life, Ocean circulation, Tracers, Oceans, Coasts, Lakes, Data collections, Data processing.
Identifiers: *ERTS.

Techniques have been developed for defining coastal circulation patterns using sediment as a natural tracer, allowing the formulation of new circulation concepts in some geographical areas and, in general, better defining the seasonal characteristics of coastal circulation. An analytical technique for measurement of absolute water depth based upon the ratios of two MSS channels has been developed. In general, the problem of separating and measuring water color components such as turbidity, chlorophyll, and bottom reflection is a complex one requiring further basic research in order to understand the component properties of a total water signature. Ice features greater than 70 meters in width can be detected, and both arctic and antarctic icebergs have been identified. Because of the large daily overlap of ERTS-1 coverage at high latitudes, some tracking and quantitative measurements of ice movement are possible. In the application area of living marine resources, the use of ERTS-1 image-density patterns as a potential indicator of fish school location has been demonstrated for one coastal commercial resource, menhaden. Ocean dynamics is another area where large-scale synoptic coverage is required. ERTS-1 data have been used to locate ocean current boundaries using ERTS-1 image-density enhancement, and some techniques are under development for measurement of suspended particle concentration and chlorophyll concentration. (See also W75-07497) (Sims-ISWS)
W75-07502

ENVIRONMENT SURVEYS,
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
L. R. Greenwood.
In: Third Earth Resources Technology Satellite Symposium, Vol III, Discipline Summary Reports, Washington, D.C., December 10-14, 1973: NASA SP-357, p 107-122, May 1974. 34 ref, 2 append.

Descriptors: *Remote sensing, *Satellites(Artificial), *Monitoring, *Environment, Path of Pollutants, Water pollution, Strip mines, Water quality, Pollutants, Wildlife, Wildlife habitats, Surveys, Data collections, Data processing.
Identifiers: *ERTS.

Recent findings have further verified that ERTS imagery can detect smoke plumes, aircraft contrails, urban haze, atmospheric aerosols, and certain short-lived events of national and international significance. Suspended sediment is a water pollutant that occurs as a result of natural processes as well as those caused by man. The sediment load of near-surface waters can be clearly identified, and in some cases the sources can be located and current directions mapped. Manmade pollution caused by industrial chemical dumping, sewage disposal, and oil spills has been identified; pollutant location, areal extent, and even dispersal can be measured. The important identifications and measurements include delineation of strip-mining areas in which not only the stripped areas but also the reclaimed regions are measured, monitoring of construction practices, mapping to allow siting of new construction, and mapping of urban quality. Under normal population densities, terrestrial wildlife species are not resolvable on ERTS-1 imagery. However, wildlife investigators have been successful in identifying and measuring habitat factors that have both direct and indirect influences on wildlife populations. The different combinations of vegetation, soil, and surface water as affected by altitude, climate, and latitude are very meaningful indicators of supportive systems for bird and mammal populations. (See also W75-07497) (Sims-ISWS)
W75-07503

INTERPRETATION TECHNIQUES,
National Aeronautics and Space Administration, Houston, Tex. Lyndon B. Johnson Space Center.
For primary bibliographic entry see Field 7C.
W75-07504

VIBRATORY COMPACTION IN THE LABORATORY OF GRANULAR MATERIALS IN LONG COLUMNS,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 2F.
W75-07559

NASA REMOTE SENSING OF SEA ICE IN AIDJEX,
Geological Survey, Tacoma, Wash.
For primary bibliographic entry see Field 2C.
W75-07564

THREE TYPES OF REMOTE-READING DENDROGRAPHS,
Geological Survey, Reston, Va.
R. L. Phipps, and W. M. Yater, Jr.
Ecology, Vol 55, No 2, p 454-457, Early Spring 1974. 4 fig, 5 ref.

Descriptors: *Instrumentation, *Trees, *Growth rates, Dendrochronology, Plant growth.
Identifiers: *Dendrographs.

Three types of remote-reading dendrographs were developed, and all 3 are capable of registering minute changes in tree trunk radius. They are designed for remote operation, requiring periodic checks as infrequently as once a month. They are self-contained in small, lighweight, weatherproof cases, may be easily and quickly installed on a tree, and may be read with any of a variety of meters and recorders. These dendrographs are basically mechanisms for translating linear motion (change in tree trunk radius) to rotational movement which can be sensed by a continuous-rotation variable resistor. The first of the three dendrographs to be developed accomplished this by employing a machinist's dial indicator. The others convert linear to rotational movement by a lever or a lever and gear arrangement. (Knapp-USGS)
W75-07577

WATER-QUALITY STUDIES TODAY AND TOMORROW,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 5A.
W75-07579

STOCHASTIC MODELING OF GROUNDWATER SYSTEMS,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2F.
W75-07595

A DIVER-OPERATED DREDGE FOR COLLECTING QUANTITATIVE BENTHIC SAMPLES IN SOFT SEDIMENTS,
Rice Univ., Houston, Tex.
For primary bibliographic entry see Field 2J.
W75-07614

FORMULATING CONVERSION TABLES FOR STICK-MEASURE OF SACRAMENTO PRECIPITATION STORAGE GAGES,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
F. R. Larson.
U.S. Department of Agriculture, Forest Service, Research Note RM-276, 2 p, December, 1974. 1 fig, 1 tab, 6 ref.

Descriptors: *Rain gages, *Calibrations, *Precipitation gages, Precipitation(Atmospheric), Instrumentation, Mathematical models, Measurement, Colorado, *Instrumentation.

Sacramento precipitation storage gages are usually built to specifications by local sheet metal companies where quality control is limited. Two mathematical models for estimating precipitation measured in locally constructed gages are presented. A calibration technique is also described. (Witt-IPC)
W75-07654

STATE OF ILLINOIS PUBLIC WATER SUPPLIES DATA BOOK,
Illinois State Government, Springfield.
January 1, 1970. 99 p, 1 tab.

Descriptors: *Municipal water, *Illinois, *Water sources, *Water works, *Water supply, *Groundwater, Pumping plants, Surface waters, Data collections, Water treatment, Treatment facilities, Fluoridation, Use rates.
Identifiers: Mineral content, Public water supplies, Population data.

Data are given on all public water supplies for Illinois. This includes a statistical summary of various aspects of water supplies such as sources, water utilities providing public service, pumpage, mineral quality of sources, types of treatment for surface and ground supplies, fluoridation, and population data. The data on the specific communities or facilities describes the population served, number of services, source of supply, capacity impounded and the plant capacity. The type of treatment used is also given. User charges and mineral content are indicated for each facility. (Poertner)
W75-07675

APPLICATION AND PROCUREMENT OF AUTOMATIC WASTEWATER SAMPLERS,
National Environmental Research Center, Cincinnati, Ohio.
For primary bibliographic entry see Field 5A.
W75-07702

INTERFACING A 24-POINT ANALOG RECORDER TO A COMPUTER CONTROLLED TELEMETRY LINE,
National Environmental Research Center, Cincinnati, Ohio.
J. M. Teuschler.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-241 086, $3.75 in paper copy, $2.25 in microfiche. Report EPA-670/4-75-002, February 1975. 25 p, 9 fig. 1HA327; ROAP 01AAD; Task 10.

Descriptors: Remote control , Control systems, Data processing, *Data transmission, *Instrumentation, Remote sensing, *Logging(Recording), *Telemetry, Electrical equipment.
Identifiers: Logic circuits, Control circuits, Timing circuits, *Analog recorders.

Interface circuitry was designed so that telemetered data originating from various remote stations could be recorded by both a digital computer and an analog recorder. The entire interface circuitry is mounted on a 3-1/2 x 2-1/2 inch printed circuit card and installed in the receiver. Data from the two methods of collection can, therefore, be collected and a comparison can be made. A switching net-

work also permits computer control with computer and recorder logging; or computer logging only; or recorder logging only. (EPA)
W75-07703

PERFORMANCE OF THE ISCO MODEL 1391 WATER AND WASTEWATER SAMPLER,
National Environmental Research Center, Cincinnati, Ohio.
For primary bibliographic entry see Field 5A.
W75-07704

EXPERIMENTS IN OCEANOGRAPHIC AEROSPACE PHOTOGRAPHY-III-SOME FILMS AND TECHNIQUES FOR IMPROVED OCEAN IMAGE RECORDING,
International Imaging Systems, Mountain View, Calif.
D. S. Ross.
Report TR-C203-5, August 1974. 60 p, 32 fig, 16 ref. NOAA Contract SOP 3-35337. Final Report.

Descriptors: *Films, *Photography, *Aerial photography, *Remote sensing, Photogrammetry.
Identifiers: *Ocean image recording, *Multispectral imagery, Aerospace photography, Multispectral cameras, Photographic films, Contrast-detection thresholds, Light transmission.

Photographic materials, equipment, and techniques are available for achieving very significant improvements in blue and green ocean image recording; a multispectral system can be standardized for operational use with a minimum of further development. Acquiring blue and green multispectral imagery of ocean subjects with films such as Royal Ortho 2569 is operationally feasible; such images contain, by several factors, more spectral and spatial information than that obtained with conventional aerial black-and-white or color films. Water penetration is significantly improved, and water color differences are much enhanced. Information is secured which is not recorded at all on standard emulsions. Contrast degradation effects of atmospheric and water hazes are greatly diminished. (NOAA)
W75-07720

WATER CURRENT OR TIDE DIRECTION-OF-FLOW INDICATOR,
H. M. Levy.
U.S. Patent No. 3,869,911, 3 p, 3 fig, 3 ref; Official Gazette of the United States Patent Office, Vol 932, No 2, p 411, March 11, 1975.

Descriptors: *Patents, *Tides, *Currents(Water), *Indicators, Flow, Equipment, Ocean currents.
Identifiers: Flow direction, Direction indicators.

A metallic coated loop is attached to a rigid float structure. An arrow indicates the direction in which the float is being dragged. The loop is a hollow tube and hence buoyant. A major mass of the float being under the water surface gains the full effect of drag of the current deterring any substantial effect of wind. (Sinha-OEIS)
W75-07823

A KINEMATIC ANALYSIS OF TROPICAL STORM BASED ON ATS CLOUD MOTIONS,
Chicago Univ., Ill. Dept. of the Geophysical Sciences.
For primary bibliographic entry see Field 2B.
W75-07824

7C. Evaluation, Processing and Publication

WATER RESOURCE OBSERVATORY WIND AND SOLAR RADIATION DATA WATER YEARS 1973 AND 1974,
Wyoming Univ., Laramie. Water Resources Research Inst.
V. E. Smith.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-241 514, $4.75 in paper copy, $2.25 in microfiche. Water Resources Research Series No. 51, November 1974. 83 p. OWRT A-015-WYO(1).

Descriptors: *Wyoming, *Data collections, *Wind velocity, *Solar radiation, Winds, *Rocky Mountain region, Anemometers, Measurement, Instrumentation.
Identifiers: Laramie(Wyo), Wind data.

Wind data that have been reduced from recording anemometer charts and from readings of totalizing anemometers plus incident solar radiation data from various stations operated by the University of Wyoming in and adjacent to Laramie, Wyoming are presented in tabular form. The period covered is from October 1972 through September 1974.
W75-07354

THE INTERRELATIONSHIP OF ECONOMIC DEVELOPMENT AND ENVIRONMENTAL QUALITY IN THE UPPER COLORADO RIVER BASIN: AN INTERINDUSTRY ANALYSIS,
Colorado Univ., Boulder. Dept. of Economics.
For primary bibliographic entry see Field 6B.
W75-07377

A REVIEW AND EVALUATION OF MULTIOBJECTIVE PROGRAMMING TECHNIQUES,
Johns Hopkins Univ., Baltimore, Md. Dept. of Geography and Environmental Engineering.
For primary bibliographic entry see Field 6A.
W75-07385

WATER QUALITY MODELING BY MONTE CARLO SIMULATION,
Maine Univ., Orono. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W75-07386

A GLOBAL OCEAN-ATMOSPHERE CLIMATE MODEL. PART I. THE ATMOSPHERIC CIRCULATION,
National Oceanic and Atmospheric Administration, Princeton, N.J. Geophysical Fluid Dynamics Lab.
For primary bibliographic entry see Field 2A.
W75-07446

A GLOBAL OCEAN-ATMOSPHERE CLIMATE MODEL. PART II. THE OCEANIC CIRCULATION,
National Oceanic and Atmospheric Administration, Princeton, N.J. Geophysical Fluid Dynamics Lab.
For primary bibliographic entry see Field 2A.
W75-07447

STREAM GAGING INFORMATION, AUSTRALIA -- SUPPLEMENT 1973.
Australian Water Resources Council, Canberra.
1974. 43 p, 12 tab.

Descriptors: *Gaging stations, *River basins, *Australia, *Networks, Stations, Surface waters, *Data collections, Gaging, Stream gages, Sites, Instrumentation.

This is the fourth and final supplement to 'Stream Gauging Information, Australia,' December 1969. It contains changes and additions to the stream gaging network during the 12-month period ending December 31, 1973, and it is intended for use in conjunction with the main catalog and the three preceding supplements. During 1973, a total of 119 new stations were established throughout Australia. This number of new stations included 1 station installed for flood warning purposes. Also included were 25 stream gaging stations and 1 tide recorder which were omitted in previous publications and 5 reestablished stations. Thirty-three stations have been equipped with superior instruments and were listed as upgraded stations. Eighty-seven stations were discontinued for various reasons. Details of all variations were listed and separate summaries provided information on classification of stations, types of gages installed, and organizations operating the stream gaging stations. (See also W75-01311, W74-00305, and W73-08738) (Sims-ISWS)
W75-07480

THIRD EARTH RESOURCES TECHNOLOGY SATELLITE SYMPOSIUM, VOLUME II, SUMMARY OF RESULTS.
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
For primary bibliographic entry see Field 7B.
W75-07484

REPORT ON THE CANADIAN ERTS PROGRAM,
Canada Centre for Remote Sensing, Ottawa (Ontario).
L. W. Morley.
In: Third Earth Resources Technology Satellite Symposium, Vol II, Summary of Results, Washington, D.C., December 10-14, 1973: NASA SP-356, p 7-11, May 1974. 1 fig.

Descriptors: *Remote sensing, *Satellites(Artificial), *Canada, Data processing, Administrative agencies, Ice, Sea ice, Cloud cover, Reservoirs, Forest fires, Pipelines, Highways, Groundwater, Wells.
Identifiers: *ERTS.

Production statistics on Canadian ERTS imagery, a summary of several cost benefit case histories, and recommendations for the future of the international aspects of ERTS were considered. Under a four-year collaborative agreement between the United States and Canada, the Canada Centre for Remote Sensing reads out and distributes the ERTS data of Canada. The Canadian receiving station is at Prince Albert, Saskatchewan. Ice Forecasting Central, of the Department of the Environment, has recommended that April aircraft flights, which are used to determine ice conditions in the Arctic, be replaced by ERTS quick-look imagery. The flights utilize about 50 hours at a cost of approximately $50,000, compared to the ERTS imagery cost of $1500. ERTS imagery is being used in Saskatchewan to map 42 forest fire burns across the northern part of the province. A profitable application of ERTS imagery is in the mapping of large reservoirs in hydropower development projects. High benefit applications in Canada of ERTS imagery are predicted in land use mapping and in the selection of routes for pipelines, transmission lines, and highways. ERTS imagery is being used together with larger scale imagery in studies to select a route for the Polar Gas Pipeline. In spite of the fact that ERTS has been up for a year and a half, the international community has just begun to be aware of its importance. (See also W75-07484) (Sims-ISWS)
W75-07485

ENVIRONMENTAL SURVEYS IN ALASKA BASED UPON ERTS DATA,
Alaska Univ., College.
For primary bibliographic entry see Field 7B.
W75-07486

GEOLOGIC EVALUATION AND APPLICATIONS OF ERTS-1 IMAGERY OVER GEORGIA,
Georgia State Geological Survey, Atlanta.
For primary bibliographic entry see Field 7B.
W75-07487

ERTS PROGRAM OF THE U.S. ARMY CORPS OF ENGINEERS,
Corps of Engineers, Washington, D.C.
J. W. Jarman.
In: Third Earth Resources Technology Satellite Symposium, Vol II, Summary of Results, Washington, D.C., December 10-14, 1973: NASA SP-356, p 62-75, May 1974. 8 fig, 1 tab.

Descriptors: *Remote sensing, *Satellites(Artificial), *Data processing, Land use, Vegetation, Sedimentation, Dams, Snowpack, Ice, Permafrost, Coasts, Mapping, Water circulation, Hydrography, Data collections, Louisiana, Chesapeake Bay, Alaska.
Identifiers: *ERTS.

ERTS imagery was used extensively for mapping land use and vegetative cover for an atlas that was compiled as an inventory of basic environmental data for the Atchafalaya area of southern Louisiana. From ERTS data it was possible to acquire accuracy that is probably much greater than could be obtained by traditional methods. The work involved 20 man-weeks of effort, and would probably have been twice that if the ERTS data had not been available. In a study of the Chesapeake Bay area, an attempt was made to delineate the sediment content of five test areas that flowed into the bay. It was found that by visual inspection of the ERTS imagery water bodies that were less than 40,000 square meters in surface area could be located on band 7. Sediment concentrations in Cook Inlet of Alaska were investigated with ERTS imagery. Permafrost mapping, snowpack, and icing were also investigated. Digital processing and enhancement has made it possible to map the gross patterns of the coastal sedimentation, the littoral processes, the way the suspended solids are carried along the coast, where they are deposited, and where these solids come from. Hydrographic surveys of the Fiji Islands have been made with use of ERTS data. (See also W75-07484) (Sims-ISWS)
W75-07489

A REVIEW OF INITIAL INVESTIGATIONS TO UTILIZE ERTS-1 DATA IN DETERMINING THE AVAILABILITY AND DISTRIBUTION OF LIVING MARINE RESOURCES,
National Aeronautics and Space Administration, Bay Saint Louis, Miss. Earth Resources Lab., and National Marine Fisheries Service, Bay Saint Louis, Miss. Fisheries Engineering Lab.
For primary bibliographic entry see Field 7B.
W75-07490

AUTOMATED STRIP MINE AND RECLAMATION MAPPING FROM ERTS,
Ohio State Univ., Columbus.
For primary bibliographic entry see Field 7B.
W75-07491

UTILITY OF ERTS FOR MONITORING THE BREEDING HABIT OF MIGRATORY WATERFOWL,
Environmental Research Inst. of Michigan, Ann Arbor.
For primary bibliographic entry see Field 7B.
W75-07492

AGRICULTURE, FORESTRY, RANGE RESOURCES,
National Aeronautics and Space Administration, Houston, Tex., Lyndon B. Johnson Space Center.
R. B. MacDonald.
In: Third Earth Resources Technology Satellite Symposium, Vol II, Summary of Results, Washington, D.C., December 10-14, 1973: NASA SP-356, p 116-125, May 1974. 10 fig, 2 tab.

Descriptors: *Remote sensing, *Satellites(Artificial), *Surveys, *Mapping, Agriculture, Soil surveys, Soil classification, Crops, Forestry, Grasslands, Ranges, Vegetation, Data collections, Data processing.
Identifiers: *ERTS.

The imaginative use of data acquired by meteorological satellites, together with crop acreage information such as has been provided by ERTS, promises a means of estimating crop production over large areas in a cost effective and timely manner. Timely information on regional range-forage conditions is required to support sound management decisions. An important indicator of rangeland forage conditions is the biomass content. It has been found that the multitemporal data acquired by ERTS is able to provide a measure of this important indicator volume. Investigators have demonstrated that ERTS data provide a valuable means of recognizing soil association boundaries and establishing a base map for listing soils information. In-place mapping of timber volumes by district over a forest provides critical information to the forest manager. Data from ERTS, remote sensing aircraft, ground acquisition, computers, and mathematical models have been combined to develop an approach that offers a cheaper and faster method of inventorying standing timber volume. (See also W75-07484) (Sims-ISWS)
W75-07493

WATER RESOURCES,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
For primary bibliographic entry see Field 7B.
W75-07494

LAND USE AND MAPPING,
National Aeronautics and Space Administration, Bay Saint Louis, Miss., Earth Resources Lab.
For primary bibliographic entry see Field 7B.
W75-07495

MINERAL RESOURCES, GEOLOGICAL STRUCTURES, AND LANDFORM SURVEYS,
National Aeronautics and Space Administration, Greenbelt, Md., Goddard Space Flight Center.
For primary bibliographic entry see Field 7B.
W75-07496

THIRD EARTH RESOURCES TECHNOLOGY SATELLITE SYMPOSIUM, VOLUME III, DISCIPLINE SUMMARY REPORTS,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
Symposium held at Washington, D.C., December 10-14, 1973: NASA SP-357, May 1974. 155 p, append. Freden, S. C., Mercanti, E. P., and Friedman, D. B., editors.

Descriptors: *Remote sensing, *Satellites(Artificial), *Data processing, *Data collections, Agriculture, Forestry, Ranges, Land use, Mapping, Geology, Water resources, Oceanography, Environment, Analytical techniques.
Identifiers: *ERTS.

This symposium was the third in a series on the significant results obtained from the first Earth Resources Technology Satellite (ERTS-1). Volume III contains the Discipline Summary Reports. These were based on reports produced from a two-week series of intensive interviews with the individual ERTS-1 principal investigators and then updated and extended from the material presented at the symposium. The reports were written by working groups in each of the disciplines which were convened at the end of the symposium. These working groups were chaired by the respective discipline session chairmen and were composed of selected specialists in the various disciplines. Results were summarized for the following disciplines: (1) agriculture, forestry, range resources; (2) inland use and mapping; (3) mineral resources, geological structure, and landform surveys; (4) water resources; (5) marine resources; (6) environment surveys; (7) interpretation techniques. (See W75-07498 thru W75-07504)
W75-07497

AGRICULTURE, FORESTRY, RANGE RESOURCES,
National Aeronautics and Space Administration, Houston, Tex., Lyndon B. Johnson Space Center.
W. J. Crea.
In: Third Earth Resources Technology Satellite Symposium, Vol III, Discipline Summary Reports, Washington, D.C., December 10-14, 1973: NASA SP-357, p 1-14, May 1974. 33 ref, 2 append.

Descriptors: *Remote sensing, *Satellites(Artificial), *Surveys, *Mapping, Agriculture, Soil surveys, Soil classification, Crops, Land use, Forests, Forestry, Grasslands, Ranges, Vegetation, Analytical techniques, Data collections, Data processing.
Identifiers: ERTS.

Identification of major crops was accomplished by both photointerpretation and ADP techniques to accuracies ranging between 70 and 99%. Signature extension of training field data was successfully accomplished up to 80.5 km (50 mi) for major crops with very little loss in accuracy and was moderately successful for bare soil and alfalfa over a south-to-north distance of 708 km (440 mi). Investigators using multistage analysis techniques of ERTS-1 data have demonstrated the capability to economically stratify, estimate volume, and locate known tracts of discrete forested areas. Investigations to detect forest stress in early stages were basically unsuccessful due to the subtle change that accompanies most stress. Range resources have provided a formidable challenge for many years for remote sensing investigators who have attempted to classify or identify the dominant specie or plant community on ranglands or wildlands. However, it appears there are now two approaches being implemented: one for specie/plant community identification, and the other for estimation of forage products (biomass) available for livestock and wildlife. Identification of major soil associations was accomplished by both photointerpretation and ADP techniques. (See also W75-07497) (Sims-ISWS)
W75-07498

LAND USE AND MAPPING,
National Aeronautics and Space Administration, Bay, Saint Louis, Miss. Earth Resources Lab.
For primary bibliographic entry see Field 7B.
W75-07499

MINERAL RESOURCES, GEOLOGICAL STRUCTURE, AND LANDFORM SURVEYS,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
N. M. Short.
Third Earth Resources Technology Satellite Symposium, Vol III, Discipline Summary Reports, Washington, D.C., December 10-14, 1973: NASA SP-357, p 33-51, May 1974. 47 ref, 2 append.

Descriptors: *Remote sensing, *Satellites(Artificial), *Geologic mapping, *Natural resources, Mapping, Surveys, Exploration, Geomorphology, Mining, Structural geology, Faults(Geologic), Folds(Geologic), Joints(Geologic), Fractures(Geologic), Data collections, Data processing.
Identifiers: *ERTS.

In regions of sparse vegetation, good geologic reconnaissance maps can often be prepared from ERTS imagery where distinctive outcrop patterns occur. Sometimes these maps are superior to ground-based geologic maps in that contacts may be better delineated in the overview. Good mapping from ERTS can be done at scales up to

1:250,000 usually cheaper and faster than by other methods (although the relative accuracies have yet to be assessed). The major contribution of ERTS to geology continues to be the exceptional ability to show large structural features, such as folded mountain belts, major strike-slip fault systems, domes and uplifts, and crystalline shield or piedmont terrain, of regional or subcontinental size. ERTS is effective in revealing new 'linears,' many of which prove to be faults, joints, or fracture zones upon field examination. Under appropriate conditions, both metals and nometallic deposits should be detectable from ERTS if these have adequate surface expression. This usually involves recognition of such proven 'ore guides' as surface alteration ('gossan' or limonite stains, clays, and sulphates), structural controls (mainly intersections of fractures, foliation, and such), and surface exposures of host structures (stocks, veins, folds, and domes). ERTS has already proved capable of assessing natural conditions that could prove hazardous in road building. Regional characteristics of terrain undergoing extensive erosion accelerated by man's activities are being defined in parts of southern Arizona. ERTS is leading to a new approach in derivation of earthquake hazards maps. (See also W75-07497) (Sims-ISWS)
W75-07500

WATER RESOURCES,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
For primary bibliographic entry see Field 7B.
W75-07501

MARINE RESOURCES,
National Aeronautics and Space Administration, Bay, Saint Louis, Miss., Earth Resources Lab.
For primary bibliographic entry see Field 7B.
W75-07502

ENVIRONMENT SURVEYS,
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
For primary bibliographic entry see Field 7B.
W75-07503

INTERPRETATION TECHNIQUES,
National Aeronautics and Space Administration, Houston, Tex. Lyndon B. Johnson Space Center.
J. L. Dragg.
In: Third Earth Resources Technology Satellite Symposium, Vol III, Discipline Summary Reports, Washington, D.C., December 10-14, 1973: NASA SP-357, p 123-143, May 1974. 4 fig, 9 tab, 28 ref, 2 append.

Descriptors: *Remote sensing, *Satellites(Artificial), *Data processing, Data collections, Photogrammetry, Data storage and retrieval, Analytical techniques.
Identifiers: *ERTS, Enhancement, Corrections, Registration, Pattern recognition.

The image enhancement and geometric correction and registration techniques developed and/or demonstrated on ERTS data are relatively mature and greatly enhance the utility of the data for a large variety of users. Pattern recognition was improved by the use of signature extension, feature extension, and other classification techniques. Many of these techniques need to be developed and generalized to become operationally useful. Advancements in the mass precision processing of ERTS were demonstrated, providing the hope for future earth resources data to be provided in a more readily usable state. Also in evidence is an increasing and healthy interaction between the techniques developers and the user/applications investigators. (See also W75-07497) (Sims-ISWS)
W75-07504

COMPUTER SIMULATION OF LAND USE DYNAMICS,
Oregon State Univ., Corvallis. Willamette Simulation Unit.
For primary bibliographic entry see Field 6A.
W75-07509

ECONOMIC ANALYSIS OF FLOOD DETENTION STORAGE BY DIGITAL COMPUTER,
Kentucky Water Resources Inst., Lexington.
For primary bibliographic entry see Field 6F.
W75-07518

SIMULATION OF THE WATER BALANCE FOR PLANTS GROWING ON COARSE-TEXTURED SOILS,
Commonwealth Scientific and Industrial Research Organisation, Wembley (Australia). Div. of Land Resources Management.
For primary bibliographic entry see Field 2I.
W75-07523

USE OF TIME-LAPSE PHOTOGRAPHY TO ASSESS POTENTIAL INTERCEPTION IN ARIZONA PONDEROSA PINE,
Arizona Univ., Tucson. Dept. of Watershed Management.
For primary bibliographic entry see Field 2C.
W75-07547

FLOODS IN AND NEAR THE CHARLOTTE AMALIE AREA, ST. THOMAS, U.S. VIRGIN ISLANDS,
Geological Survey of Puerto Rico, San Juan.
W. J. Haire, and K. G. Johnson.
Open-file report (Puerto Rico Map Series No 3), 1973. 4 sheets, 8 fig, 1 tab, 3 maps, 1 ref.

Descriptors: *Floods, *Virgin Islands, Flood frequency, Maps, Stage-discharge relations, Flood recurrence interval.
Identifiers: *Charlotte Amalie(V.I.).

This 4-sheet map report provides information that will aid administrators, planners, engineers, and others concerned with development in areas subject to flooding in and near Charlotte Amalie on the south coast of St. Thomas. This information is useful to those responsible for formulating flood-plain regulations that would minimize flood damage. St. Thomas is characterized by rugged terrain and its streams head in the volcanic uplands that form a central ridge the length of the island. The steep slopes cause rapid runoff. Most of the streamflow on St. Thomas results from direct runoff, therefore, the streams usually cease to flow several hours to a day or two after rainfall stops. Floodwaters also recede rapidly and inundation often lasts less than a day. At least four severe floods have occurred since 1867. The largest flood was that of May 8, 1960. Intense rain fell on the entire island and the U.S. Weather Bureau recorded a 2-day total of 13.25 inches at Charlotte Amalie. The second largest flood occurred on October 9, 1916, and was caused by a hurricane of great intensity, the center of which passed over the U. S. Virgin Islands. The areas inundated by the 1969 flood are shown on maps. (Knapp-USGS)
W75-07550

GEOHYDROLOGY OF BACA AND SOUTHERN PROWERS COUNTIES, SOUTHEASTERN COLORADO,
Geological Survey, Denver, Colo.
L. A. Hershey, and E. R. Hampton.
Water-Resources Investigations 16-74 (open-file report), August 1974. 1 sheet, 6 ref.

Descriptors: *Hydrogeology, *Colorado, *Water resources, *Groundwater, Water levels, Aquifer characteristics, Maps, Hydrologic data, Water yield, Withdrawal.
Identifiers: Baca County(Colo), Prowers County(Colo).

The only dependable source of water for all uses in Baca and southern Prowers Counties, Colorado, is groundwater. Groundwater is withdrawn from the three principal aquifers in the area--the Ogallala, the Dakota, and the Cheyenne-Dockum. Areas of occurrence and approximate altitude of the water table in 1967 are shown by a map. In the Ogallala, there has been little change in the altitude of the water table from 1964 to 1972. The thickness of the Ogallala Formation ranges widely throughout the area--from about 300 feet in south-central Baca County and 360 feet in eastern Prowers County to zero at many places. Approximate altitude of the potentiometric surface of the Dakota, Dockum, and Cheyenne-Dockum aquifers and their saturated thicknesses are also shown on maps. Thickness of the Dakota formation ranges from 0 to 240 feet. Saturated thickness ranges from about 230 feet in southeastern Prowers County to zero where the formation is absent. Water-level declines in wells that tap the Dakota (1956-67) were as much as 23 feet in the northern part of the area near or in areas of substantial pumpage. Water levels in Dakota wells in central Baca County have generally risen during 1947-67. Levels in wells that tap the Cheyenne-Dockum have declined as much as 285 feet during 1947-67 and 150 feet during 1962-66. The depth to the top of the Cheyenne Sandstone member is as much as 600 feet. The Cheyenne is not present in southeastern Baca County nor along the Baca-Prowers County line. (Knapp-USGS)
W75-07551

WATER QUALITY OF TAMPA BAY, FLORIDA: DRY-WEATHER CONDITIONS, JUNE 1971,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 5A.
W75-07556

GENERALIZED STREAM TEMPERATURE ANALYSIS SYSTEM,
Geological Survey, Bay Saint Louis, Miss. Gulf Coast Hydroscience Center.
For primary bibliographic entry see Field 5B.
W75-07561

NASA REMOTE SENSING OF SEA ICE IN AIDJEX,
Geological Survey, Tacoma, Wash.
For primary bibliographic entry see Field 2C.
W75-07564

HYDROLOGIC DATA OF THE HOOSIC RIVER BASIN, MASSACHUSETTS,
Geological Survey, Boston, Mass.
For primary bibliographic entry see Field 2E.
W75-07565

HYDROLOGIC RECORDS FOR LAKE COUNTY, FLORIDA, 1972-73,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 2E.
W75-07566

EXTENT AND FREQUENCY OF FLOODS ON SCHUYLKILL RIVER NEAR PHOENIXVILLE AND POTTSTOWN, PENNSYLVANIA,
Geological Survey, Harrisburg, Pa.
For primary bibliographic entry see Field 4A.
W75-07567

PUERTO RICO WATER RESOURCES PLANNING MODEL STUDY,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 6A.
W75-07568

WATER RESOURCES DATA FOR GEORGIA, 1974.
Geological Survey, Doraville, Ga.

U.S. Geological Survey, WRD 6481 Peachtree Industrial Blvd., Suite B, Doraville, Ga 30340. Data Report, 1975. 327 p, 4 fig, 4 tab, 7 ref.

Descriptors: *Basic data collections, *Georgia, *Hydrologic data, *Streamflow, *Water quality, Gaging stations, Stream gages, Stage-discharge relations, Water measurement, *Data collections.

Water resources data for the 1974 water year for Georgia include records of streamflow or reservoir storage at gaging stations, partial-record stations, miscellaneous sites, and records of water-quality data on the chemical and physical characteristics of surface water as well as records for a few pertinent gaging and water-quality stations in bordering States. These represent the Georgia portion of the National Water Data System collected by the U.S. Geological Survey and cooperating State and Federal agencies. The base data collected at gaging stations consists of records of stage and measurements of discharge of streams or canals, and stage, surface area, and contents of lakes or reservoirs. In addition, observations of factors affecting the stage-discharge relation or the stage-capacity relation, weather records, and other information are used to supplement base data in determining the daily flow or volume of water in storage. Water-quality information is presented for chemical quality, microbiological, and water temperature. (Knapp-USGS)
W75-07569

WATER RESOURCES OF THE CURLEW VALLEY DRAINAGE BASIN, UTAH AND IDAHO,
Geological Survey, Salt Lake City, Utah.
For primary bibliographic entry see Field 4A.
W75-07570

SIMULATED WATER-LEVEL CHANGES RESULTING FROM PROPOSED CHANGES IN GROUND-WATER PUMPING IN THE HOUSTON, TEXAS, AREA,
Geological Survey, Houston, Tex.
D. G. Jorgensen, and R. K. Gabrysch.
Open-file report, November 1974. 3 sheets, 6 fig, 3 ref.

Descriptors: *Subsidence, *Withdrawal, *Texas, *Analog models, *Groundwater, Hydrogeology, Water levels, Aquifer characteristics, Drawdown, Pumping.
Identifiers: *Houston(Tex).

Because of widespread interest in the hydrologic effects of decreased groundwater pumping, the Houston area analog model was programmed with anticipated decreases and increases in some areas in the rates of groundwater withdrawals and used to predict changes in the altitudes of the potentiometric surfaces in the aquifers. In general, the water-bearing units in the area consist of the Chicot aquifer and the underlying Evangeline aquifer. The Chicot is usually divided into upper and lower units, and in some parts of the area, the base of the lower unit of the Chicot is formed by a massive sand section (Alta Loma Sand of Rose, 1943), that is heavily pumped by large-capacity wells. The aquifers are underlain by a predominantly clay layer called the Burkeville confining layer. The analog model was programmed to determine the effects of proposed changes in pumping rates in terms of simulated water-level declines or recoveries in the Evangeline and Chicot aquifers. Simulated water-level declines in the aquifers are shown for 1890-1980. Because of increases in pumping in much of the Houston area, water levels in both aquifers will continue to decline after utilization of water from Lake Livingston. However, water levels will rise in southeastern Harris County and in Galveston County. Water levels in the Pasadena area will rise as much as 40 feet in the Evangeline aquifer and as much as 100 feet in the Chicot aquifer. Marked decreases in the rates of land-surface subsidence should occur in areas where the artesian heads increase. If groundwater pumping is again increased, however, to meet increasing demands in the future, the beneficial effects will be short-lived. (Knapp-USGS)
W75-07575

WATER-RESOURCES INVESTIGATIONS IN TEXAS, FISCAL YEAR 1975.
Geological Survey, Austin, Tex.
Water-Resources Investigations report, January 1975. 34 p, 1 map.

Descriptors: *Water resources, *Texas, *Projects, Hydrologic data, Data collections, Basic data collections.

The water-resources investigations of the U. S. Geological Survey in Texas consist of the collection of basic records through the hydrologic-data network, interpretive studies, and research projects. The basic-data records and the results of investigations are published by the Geological Survey or by cooperating agencies. This report describes the water-resources projects and activities of the Geological Survey in Texas for the 1975 fiscal year (July 1, 1974, to June 30, 1975). (Knapp-USGS)
W75-07583

TEACHING WATER RESOURCE MANAGEMENT WITH THE AID OF A COMPUTER-IMPLEMENTED STIMULATOR,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Fisheries and Wildlife Sciences.
For primary bibliographic entry see Field 6B.
W75-07601

A COMPUTER PROGRAM FOR ESTIMATING COSTS OF TUNNELLING (COSTUN),
Harza Engineering Co., Chicago, Ill.
For primary bibliographic entry see Field 8B.
W75-07619

USE OF MODELING FOR PLANNING STORM WATER STRATEGIES,
Florida Univ., Gainesville.
For primary bibliographic entry see Field 5G.
W75-07677

INTERFACING A 24-POINT ANALOG RECORDER TO A COMPUTER CONTROLLED TELEMETRY LINE,
National Environmental Research Center, Cincinnati, Ohio.
For primary bibliographic entry see Field 7B.
W75-07703

DIGITAL RADAR DATA AND ITS APPLICATION IN FLASH FLOOD FORECASTING,
National Weather Service Forecast Office, Pittsburgh, Pa.
For primary bibliographic entry see Field 4A.
W75-07832

HYDROGEOLOGICAL MAPS OF THE ALLUVIAL AQUIFER IN AND ADJACENT TO THE ROCKY MOUNTAIN ARSENAL, COLORADO,
Geological Survey, Denver, Colo.
L. F. Konikow.

Descriptors: *Hydrogeology, *Colorado, *Path of pollutants, Alluvium, Water table, Bedrock, Aquifers, *Maps, Groundwater movement.
Identifiers: *Rocky Mountain Arsenal(Colo), Denver(Colo).

The hydrogeologic characteristics of the alluvial aquifer in and adjacent to the Rocky Mountain Arsenal, Colo. are described on four maps that show the configuration of the bedrock surface, generalized water-table configuration, saturated thickness of alluvium, and transmissivity of the aquifer. The maps provide data needed to compute the rate and direction of groundwater movement. The alluvium forms a complex, nonuniform, sloping, discontinuous, and heterogeneous aquifer system. Groundwater contamination in the vicinity of the Rocky Mountain Arsenal is related to the disposal of liquid industrial wastes into ponds. The movement of contaminants away from the ponds or other possible sources is partly controlled by the rates and directions of groundwater flow within the shallow alluvial aquifer that underlies most of the area. The rate and direction of groundwater flow, in turn, is controlled by the hydraulic gradient, transmissivity, and boundary conditions of the aquifer. Thus, the calculation of rates of movement and flow paths followed by contaminants in the aquifer can only be accomplished if the hydrogeologic characteristics of the aquifer are known in detail. (Knapp-USGS)
W75-07836

AVAILABILITY OF GROUND WATER IN THE SACO RIVER BASIN, EAST-CENTRAL NEW HAMPSHIRE,
Geological Survey, Concord, N.H.
J. E. Cotton.
Water-Resources Investigations 39-74, 1975. 1 sheet, 1 fig, 1 map, 2 ref.

Descriptors: *Groundwater, *New Hampshire, Water yield, *Maps, Till, Glacial drift, Sands, Gravels, Glacial aquifers, Water resources, Water quality.
Identifiers: *Saco River(NH).

This map report provides a preliminary assessment of the availability of groundwater in the Saco River basin, New Hampshire, as determined by estimating the capability of the aquifers to store and transmit water. On the map aquifers are rated as having high medium, or low potential to yield groundwater. Bedrock in most of this river basin is covered by a thin veneer of unconsolidated glacial deposits of till and layered (stratified) gravel, sand, silt, and clay. The bedrock is hard and compact; it contains recoverable water only in open fractures. The size, number, distribution, and interconnection of fractures are highly variable, but the fractures commonly are so limited in these properties that wells penetrating bedrock generally do not yield enough water to sustain supplied for municipal or industrial use. Bedrock commonly yields dependable supplies of good quality water to individual wells in amounts adequate for single family domestic needs. Till is a poor aquifer and normally does not yield enough water to meet municipal, industrial, or commercial needs. In some places till will yield enough water to large diameter dug wells to supply single family domestic needs, but this yield may not be dependable during droughts when the water table declines and there is less water in storage. Stratified deposits of gravel, sand, silt, and clay occur chiefly in the valleys. These materials have abundant pore space between grains to store groundwater; these openings may amount to 30 percent or more of the total volume of the deposit. Groundwater exploration and development in New Hampshire has been most successful in thick water-saturated sand and gravel deposits. Groundwater in the Saco River basin is generally of good chemical quality. (Knapp-USGS)
W75-07837

MAPS OF SAN GORGONIO PASS-UPPER COACHELLA VALLEY AREA, CALIFORNIA, SHOWING WATER-LEVEL CONTOURS, 1936 AND 1966-17,
Geological Survey, Menlo Park, Calif.
J. J. French.
Open-File report, 1974. 3 maps.

Descriptors: *Water levels, *Water table, *Groundwater, *California, Hydrologic data, *Maps, Contours.
Identifiers: *Coachella Valley(Calif).

Maps scaled 1:62,500 show groundwater level contours in the Coachella Valley area between Beaumont and Indio, California. A table of data on more than 100 wells is included. (Knapp-USGS)
W75-07838

MAP SHOWING DRAINAGE AREAS, HADDAM QUADRANGLE, CONNECTICUT,
Geological Survey, Hartford, Conn.
M. P. Thomas, and J. E. Palmer.
Miscellaneous Field Studies Map MF-638A (Connecticut Valley Urban Area Project Contribution 119), 1975. 1 sheet, 1 map, 1 ref.

Descriptors: *Maps, *Connecticut, *Drainage area, Streams, Watersheds(Basins), Urban hydrology, River basins.
Identifiers: *Haddam quadrangle(Conn).

A map shows stream systems and drainage areas in the Haddam quadrangle, Connecticut that contribute streamflow to selected sites on streams. Drainage areas shown have not been adjusted for the manmade changes in the natural regimens such as storm sewers, diversion dams, canals, and tunnels. (Knapp-USGS)
W75-07839

MAP SHOWING DRAINAGE AREAS, GUILFORD QUADRANGLE, CONNECTICUT,
Geological Survey, Hartford, Conn.
M. P. Thomas, and J. E. Palmer.
Miscellaneous Field Studies Map MF-583B (Connecticut Valley Urban Area Project Contribution 123), 1975. 1 sheet, 1 map, 1 ref.

Descriptors: *Maps, *Connecticut, *Drainage area, River basins, Watersheds(Basins), Urban hydrology.
Identifiers: *Guilford(Conn).

This map shows stream systems and drainage areas that contribute streamflow to selected sites on streams in the Guilford quadrangle, Connecticut. Drainage areas shown have not been adjusted for the manmade changes in the natural regimens such as storm sewers, diversion dams, canals, and tunnels. (Knapp-USGS)
W75-07840

MAP SHOWING DRAINAGE AREAS, BRANFORD QUADRANGLE, CONNECTICUT,
Geological Survey, Hartford, Conn.
M. P. Thomas, and J. E. Palmer.
Miscellaneous Field Studies Map MF-560D (Connecticut Valley Urban Area Project Contribution 124), 1975. 1 sheet, 1 map, 1 ref.

Descriptors: *Maps, *Connecticut, *Drainage area, River basins, Watersheds(Basins), Urban hydrology.
Identifiers: *Branford(Conn).

This map shows stream systems and drainage areas that contribute streamflow to selected sites on streams in the Branford quadrangle, Connecticut. Drainage areas shown have not been adjusted for the manmade changes in the natural regimens such as storm sewers, diversion dams, canals, and tunnels. (Knapp-USGS)
W75-07841

MAP SHOWING DRAINAGE AREAS, NEW HAVEN-WOODMONT QUADRANGLES, CONNECTICUT,
Geological Survey, Hartford, Conn.
M. P. Thomas.
Miscellaneous Field Studies Map MF-557B (Connecticut Valley Urban Area Project Contribution 125), 1975. 1 sheet, 1 map, 1 ref.

Descriptors: *Maps, *Connecticut, *Drainage area, River basins, Watersheds(Basins), Urban hydrology.
Identifiers: *New Haven(Conn), *Woodmont(Conn).

This map shows stream systems and drainage areas that contribute streamflow to selected sites on streams in the New Haven and Woodmont quadrangles, Connecticut. Drainage areas shown have not been adjusted for the manmade changes in the natural regimens such as storm sewers, diversion dams, canals, and tunnels. (Knapp-USGS)
W75-07842

MAP SHOWING DRAINAGE AREAS, NIANTIC QUADRANGLE, CONNECTICUT,
Geological Survey, Hartford, Conn.
M. P. Thomas.
Miscellaneous Field Studies Map MF-593B (Connecticut Valley Urban Area Project Contribution 126), 1975. 1 sheet, 1 map, 1 ref.

Descriptors: *Maps, *Connecticut, *Drainage area, River basins, Watersheds(Basins), Urban hydrology.
Identifiers: *Niantic(Conn).

This map shows stream systems and drainage areas that contribute streamflow to selected sites on streams in the Niantic Quadrangle, Connecticut. Drainage areas shown have not been adjusted for the manmade changes in the natural regimens such as storm sewers, diversion dams, canals, and tunnels. (Knapp-USGS)
W75-07843

MAP SHOWING DRAINAGE AREAS, OLD LYME QUADRANGLE, CONNECTICUT,
Geological Survey, Hartford, Conn.
M. P. Thomas.
Miscellaneous Field Studies Map MF-558C (Connecticut Valley Urban Area Project Contribution 127), 1975. 1 sheet, 1 map, 1 ref.

Descriptors: *Maps, *Connecticut, *Drainage area, River basins, Watersheds(Basins), Urban hydrology.
Identifiers: *Old Lyme(Conn).

This map shows stream systems and drainage areas that contribute streamflow to selected sites on streams in the Old Lyme quadrangle, Connecticut. Drainage areas shown have not been adjusted for the manmade changes in the natural regimens such as storm sewers, diversion dams, canals, and tunnels. (Knapp-USGS)
W75-07844

GEOLOGIC MAP OF WALKER COUNTY, ALABAMA,
Geological Survey, Tuscaloosa, Ala.
K. D. Wahl, and D. M. O'Rear.
Alabama Geological Survey, University, Map 123, 1972. 1 sheet.

Descriptors: *Aquifers, *Geologic mapping, *Alabama, Stratigraphy, Geology, Water resources, Groundwater.
Identifiers: *Walker County(Ala).

The geology of Walker County, Alabama is shown on a map scaled about 2 miles to 1 inch. The entire county is underlain by the Pottsville Formation of Pennsylvanian age. There are a few outcrops of the Coker Formation of Cretaceous age in the northwest part of the county. Stream valleys have terrace deposits and alluvium. The Pottsville Formation, the principa.l aquifer in the county, is 1,000 to 3,000 feet thick and consists chiefly of sandstone and shale. The Pottsville also contains beds of coal which have been mined throughout the county. (Knapp-USGS)
W75-07845

WATER AVAILABILITY AND GEOLOGY OF WALKER COUNTY, ALABAMA,
Geological Survey, Tuscaloosa, Ala.
D. M. O'Rear, K. D. Wahl, and P. O. Jefferson.
Alabama Geological Survey, University, Map 120, 1972. 21 p, 3 fig, 2 plate, 5 tab, 12 ref.

Descriptors: *Water resources, *Alabama, *Groundwater, *Surface waters, Water yield, Hydrogeology, Streamflow, Water wells, Water quality, Basic data collections.
Identifiers: *Walker County(Ala).

The largest quantities of groundwater in Walker County, Alabama are obtained from sandstone beds in the Pottsville Formation, which generally yeild less than 50 gallons per minute to individual wells. The water from the Pottsville ranges from soft to very hard, and is suitable for most uses except locally where the iron and bicarbonate concentrations may be objectionable or where the water is excessively hard. The Coker Formation is tapped by only a few wells in the country, and the alluvium in the flood plain of the Mulberry Fork of the Black Warrior River provides a limited amount of water to only a few wells. The water is generally reported to be soft and satisfactory for domestic use. Parts of two large reservoirs are in Walker County--Lewis Smith Lake, with a total storage of 1,670,700 acre-feet, and Bankhead Reservoir, with a total storage of 94,100 acre-feet. Blackwater Creek near Manchester has an average flow of 196 mgd. The chemical quality of water in streams in Walker County is relatively uniform and the water should be suitable for most uses. Water use in Walker County was estimated to be 6 mgd in 1966. Groundwater sources are estimated to supply about 15 percent of the water used in the county. (Knapp-USGS)
W75-07846

PEARL RIVER BOATWAY, ROSS BARNETT RESERVOIR TO JACKSON AREA,
Geological Survey, Jackson, Miss.
C. P. Hemphreys, Jr., and F. C. Wells.
Pearl River Basin Development District, (Jackson, Mississippi), Pearl River Boatway Map No 1, 1974. 1 sheet, 1 map.

Descriptors: *Rivers, *Mississippi, *Boating, Recreation, *Maps, Water sports, Water quality.
Identifiers: *Pearl River Boatway(Miss).

The reach of the Pearl River Boatway, Mississippi, presented in this Atlas extends from the Ross Barnett Reservoir to Conway Slough, a distance of 16.4 river miles. The river flows in its natural channel from the reservoir to the Gulf, Mobile and Ohio Railroad bridge at Jackson and has been canalized from the railroad bridge to 0.4 miles upstream from the Woodrow Wilson Bridge. Snagging and clearing have been done from the canalized reach to 0.2 mile below the mouth of Conway Slough. The width in the natural channel varies from 120 feet at low stage to 200 feet at bankfull stage and in the canalized channel from 100 to 300 feet. Banks are relatively steep along this reach of the river, but there are several places where one may land his boat and stretch his legs. The sand bars exposed during periods of low flow are good picnic and rest areas. The river is relatively free of pollution, although sediment may cause it to be muddy. The water is suitable for recreation, but it should not be used for drinking. Along the reach, fishermen may catch large-mouth bass; black and white crappie; bluegill; redear; chain pickerel; warmouth; and channel, blue, flatheat, and spoonbill catfish. Game that might be encountered include deer, squirrel, rabbit, beaver, raccoon, opossum, mink, otter, and muskrat. Wild turkey and various species of ducks also frequent the area. Tables may be used to estimate the time required to float with the current between points on the river. (Knapp-USGS)
W75-07847

PEARL RIVER BOATWAY MAP, MORGANTOWN TO SANDY HOOK, COLUMBIA AREA, MISSISSIPPI,
Geological Survey, Jackson, Miss.
J. K. Arthur.
Pearl River Basin Development District, (Jackson, Mississippi), Pearl River Boatway Map, 1974. 1 sheet, 1 map.

Descriptors: *Rivers, *Mississippi, *Boating, Recreation, *Maps, Water sports, Water quality.
Identifiers: *Pearl River Boatway(Miss).

The reach of the Pearl River Boatway presented in this atlas extends from Morgantown, Miss., 40.3 miles downstream to Sandy Hook. Channel width varies from 250 to 300 feet, depending upon the stage of the river, and depth varies from 2 feet at low water in shoal areas to over 30 feet at medium stage in deep areas. The banks are relatively steep along this reach of the river, but at Morgantown, Columbia, and Sandy Hook there are several sites where boats can be launched. Below Columbia there are many large sand bars that could be used for campsites or rest points. In general, the part of the reach from Morgantown to Columbia is deep and slow moving. Little difficulty should be encountered in boating except at extreme low water. From Columbia to Sandy Hook the river is shallower with higher velocities. At a stage of less than 5 feet on the Columbia gage, boating can be hazardous because of the shallow depths. The U.S. Army Corps of Engineers, Mobile District, has cleared logs and debris from the channel from the mouth of the river to 7 miles from Columbia. Submerged logs still present a hazard at low water in some places. The quality of water in the Pearl River above Columbia is good, but as the river passes through Columbia its quality is degraded by domestic and industrial wastes. Nowhere along this reach of the river should the water be used for drinking. The water is suitable for boating and fishing, but it may not be safe for swimming, especially in the Columbia vincinity. Several species of fish inhabit the river. Tables may be used to estimate the time required to float with the current between points on the river. (Knapp-USGS)
W75-07848

PEARL RIVER BOATWAY MAP, MONTICELLO TO MORGANTOWN, MISSISSIPPI,
Geological Survey, Jackson, Miss.
J. K. Arthur.
Pearl River Basin Development District, (Jackson, Mississippi), Pearl River Boatway Map, 1974. 1 sheet, 1 map.

Descriptors: *Rivers, *Mississippi, *Boating, Recreation, *Maps, Water sports, Water quality.
Identifiers: *Pearl River Boatway(Miss).

The reach of the Pearl River Boatway presented in this atlas extends from Monticello, Miss., 39.9 miles downstream to Morgantown. Channel width varies from 250 to 300 feet, depending upon the stage of the river, and depth varies from 2 feet at low water in shoal areas to more than 40 feet at medium stage in deep pools. The banks are very steep along this reach of the river and there is a limited number of sites where a boat can be launched, but there are many sand bars along the reach where boats can be put ashore and camps set up. The quality of water in the Pearl River between Monticello and Morgantown is adequate for boating and fishing, but it may not be safe for swimming and should not be used for drinking. At Monteicello and Morgantown pollutants enter the stream, but between these two sites, due to the sparse population, the water is not degraded by man. The Pearl River is a relatively deep, slow-moving stream in this area. Little difficulty should be encountered in boating except at extreme low water. The biggest hazard facing boatmen is submerged logs. Pearl River water is highly turbid, making logs and other submerged objects difficult to see. Numerous species of fish and game inhabit the river and area. Tables may be used to estimate the time required to float with the current between points on the river. (Knapp-USGS)
W75-07849

PEARL RIVER BOATWAY MAP, GEORGETOWN TO MONTICELLO, MISSISSIPPI,
Geological Survey, Jackson, Miss.
J. K. Arthur.
Pearl River Basin Development District (Jackson, Mississippi), Pearl River Boatway Map, 1974. 1 sheet, 1 map.

Descriptors: *Rivers, *Mississippi, *Boating, Recreation, *Maps, Water sports, Water quality.
Identifiers: *Pearl River Boatway(Miss).

The reach of the Pearl River Boatway presented in this atlas extends from Georgetown, Miss., 40.8 miles downstream to Monticello. Channel width in this reach varies from 250 to 300 feet, depending upon the stage of the river, and depth varies from 2 feet at low water in shoal areas to more than 30 feet at medium stage in deep pools. The banks are almost vertical along this reach of the river, but at Georgetown, Rockport, St. Regis Paper Mill, and Monticello, there are sites where boats can be launched. The Pearl also offers many large sand bars for camping or resting points. At Georgetown, Rockport, and Monticello, camping supplies can be obtained near the river. The water from the Pearl River should not be consumed unless treated, and it may not be safe for swimming, but the river is suitable for boating and fishing throughout the reach. In general, this reach of the river is moderately deep and slow moving. Little difficulty should be encountered in boating except at low water in shoal areas. Due to the high turbidity of the river water, submerged logs are difficult to spot, and one should be cautious while motoring on the river. Numerous species of fish and game inhabit the river and area. Tables may be used to estimate the time required to float with the current between points on the river. (Knapp-USGS)
W75-07850

8. ENGINEERING WORKS

8A. Structures

PORT DESIGN AND ANALYSIS METHODOLOGY,
Massachusetts Inst. of Tech., Cambridge. Sea Grant Project Office.
E. Frankel, B. Golden, P. Wilmes, R. Orner, and K. Chelst.
Sea Grant Publication, MITSG 74-31, Index No. 74-331-Nto, December 1, 1974. 2 Volumes. 341 p and 158 p, 64 fig, 6 tab, 95 ref, 8 append. (NOAA-75011403). NOAA Grant NG 43-72.

Descriptors: *Harbors, *Engineering structures, Economics, *Design, *Methodology, Model studies, *Coastal structures, Analysis.
Identifiers: *Port design.

Techniques are presented for planning and analysis of single purpose ports, multipurpose ports, multiport systems, and multiple purpose multiport systems. Novel approaches are described to multicommodity network flow analysis, port simulation and various methods of use in port system modeling. The appendices which are separately bound consist of the following: User's Manual for Linear Approximation Algorithm; The Ford-Bellman-Moor Shortest Path Algorithm; Method of Golden Search; Program Listings; Seaport Simulation (Tanker Terminal); Sample Run of Seaport Simulation; Port Simulation Program Details; and Approximate Fixed Charge Transportation Algorithm. (NOAA)
W75-07410

ENGINEERING CONSIDERATIONS FOR MARINAS IN TIDAL MARSHES,
Delaware Univ., Newark. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2L.
W75-07420

GREATER TAMPA UTILITY GROUP-STANDARD UTILITIES LOCATION,
Greater Tampa Utility Group, Fla.
A. J. Hanis, D. Broome, N. Agee, N. Green, and L. Young.
February 14, 1968. 28 p, 19 fig.

Descriptors: *Utilities, *Right-of-way, *Standards, *Highways, *Planning, *Pipelines, *Construction, Sewers, Water distribution(Applied), Water management(Applied), Public utilities, Public utility districts, Water works, Electric power, Electrical networks, Facilities, Legal aspects, Easements, Florida, Roads, Coordination.
Identifiers: *Utility location, Greater Tampa Utility Group, Tampa(Florida).

In 1965 the Greater Tampa Utilities Group appointed a committee to study the possibility of coordinating all utilities in this area and to provide a pattern of standardization for the location of such utilities within the public right of way of proposed street or highway improvements. The problem was twofold in that: (1) planning standards, and their general acceptance are needed to allocate space for all the various utilities whether they are overhead or underground, and (2) coordination of construction is needed for these utilities in old as well as new areas of the community. Representatives of the City of Tampa, City of Temple Terrace, Hillsborough County, the Southwest Florida Water Management District, Florida State Road Department, General Telephone, Tampa Electric, Peoples Gas and J.E. Greiner (engineering consultants) completed their recommendations in February 1968. The recommended locations of all new utility lines (Sanitary and storm sewers; water mains; electric, gas and telephone lines; fire alarm wiring, etc.) are given, both horizontally and vertically. It should be stressed that these standards are for the general guidance of the various utilities involved and in no way should be construed as an absolute requirement. Recommended utility locations are sketched for various widths of public right-of-way and easements. (Poertner)
W75-07668

AN ARCTIC WATER SUPPLY SYSTEM,
Directorate of Construction Engineering and Design Engineering, Ottawa (Ontario).
For primary bibliographic entry see Field 5F.
W75-07684

BEACH EROSION CONTROL IMPROVEMENTS, WAIKIKI BEACH, OAHU, HAWAII (KAPAHULU STORM DRAIN TO THE ELKS CLUB) (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Corps of Engineers, Honolulu, Hawaii. Pacific Ocean Div.
Available from the National Technical Information Service, U.S. Dept. of Commerce, Springfield, Va. 22161, as EIS-HI-73-0792-F, $4.75 in paper copy, $2.25 in microfiche. May 1973. 46 p, 4 fig.

Descriptors: *Groins(Structures), *Sands, *Recreation facilities, Waves(Water), Breakwaters, Recreation, Swimming, Environmental effects, *Hawaii, Beaches, Muck soils, Sea walls, Shores, Water quality, Water quality standards, Erosion, Storm drains.
Identifiers: *Environmental Impact Statements, *Waikiki Beach(HI), Oahu(HI).

The project provides for the construction of three new groins, the placement of approximately 46,000 cubic yards of sand, and the demolition of the Waikiki, Hawaii Natatorium. The sand placement will add approximately 130,000 square feet of beach, resulting in increased shoreline recreation area and improved access along the beach. The groins are designed to stabilize the reconstructed beach, allowing it to shape itself parallel to the alignment of the dominant wave front. Unavoidable adverse environmental effects include temporary impacts during the construction period, permanent loss of the Natatorium and its use, reduction of swimming area in the deep channel north of the Natatorium and increased traffic. Alternatives considered include additional sand placement protection by an offshore breakwater, retention and incorporation of the Natatorium, and preservation of the existing conditions with no beach restoration provisions. (Gagliardi-Florida)
W75-07780

MAINTENANCE OF BAY RIDGE AND RED HOOK CHANNELS, NEW YORK NAVIGATION PROJECT (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Army Engineer District, New York.
Available from the National Technical Information Service, U.S. Dept. of Commerce, Springfield, Va. 22161, as EIS-NY-73-1470-F, $3.75 in paper copy, $2.25 in microfiche. September 7, 1973. 40 p, 2 map, 1 tab.

Descriptors: *Dredging, *Channel improvement, *Economic justification, *Disposal, Turbidity, Water quality, Water pollution, Water channels, *New York, Environmental effects, Environment, Transportation, Navigation, Pollutants, Discharge measurement, Oceans.
Identifiers: *Environmental Impact Statements, *Bay Ridge(NY), Red Hook(NY).

The project involves the maintenance and dredging of an existing federal channel in Bay Ridge and Red Hook, New York to its authorized project dimensions. The work is to be performed by hopper dredge with the spoil disposed of in approved dumping grounds in the New York Bight. The project will enhance the economy of commodity transportation and continue the level of navigation safety that reduces the possibility of pollutant discharge into the water due to accidents. The adverse environmental effects will entail a temporary increase in turbidity during the dredging process of affecting water quality; and spoiling in the New York Bight, which will contribute to the accumulation of materials at the disposal site and to problems associated with ocean disposal. The alternatives considered were to forego subsequent maintenance activities and to implement various alternate methods for spoil disposal. Comment were received from the Departments of Interior, Agriculture, Commerce, Defense, Health, Education and Welfare, and Transportation and the Environmental Protection Agency and Federal Power Commission. Additional comments were submitted by the Port Authority of New York and New Jersey, the New York state Department of Environmental Conservation and the New York City Department of Health, Bureau of Sanitary Engineering. (Gagliardi-Florida)
W75-07784

PEACOCK CREEK, LIBERTY COUNTY, GEORGIA (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Army Engineer District, Savannah, Ga.
For primary bibliographic entry see Field 4A.
W75-07788

UPPER SALT CREEK WATERSHED, COOK, LAKE AND DUPAGE COUNTIES, ILLINOIS (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Soil Conservation Service, Washington, D.C.
Available from the National Technical Information Service, U.S. Dept. of Commerce, Springfield, Va. 22161, as EIS-IL-73-0866-F, $5.25 in paper copy, $2.25 in microfiche. May 1973. 102 p, 5 tab, 8 map, 1 fig.

Descriptors: *Watershed management, *Flood protection, *Recreation, *Channel improvement, Channels, Flood plains, Erosion, *Illinois, Flood control, Erosion control, Floods, Recreation facilities, Land development, Water control, Sediments, Environmental effects, Vegetation.
Identifiers: *Environmental Impact Statements, Cook County(Ill), Lake County(Ill), Dupage County(Ill).

Installation of a watershed is proposed over a nine-year period in Cook, Lake, and Dupage Counties, Illinois. Project purposes are watershed protection, flood prevention, and recreation. The project will include land treatment measures, a floodwater retarding-recreation structure, floodwater retarding structures, channel modification and 261 acres of flood plain preserves. The land treatment program will reduce erosion on construction sites by 29 percent, provide for storage of 40 to 50 percent of the soil eroded from these areas, reduce water runoff, and promote more efficient land use. Floodwater and sediment damages will be reduced by 88 percent, and the project will attract 1,610,000 annual visitor days of recreation. Approximately 261 acres of undeveloped floodplain will be preserved for low-hazard, low-intensity uses. Adverse environmental effects include disturbance of 208 acres of vegetation cover by construction, conversion of 649 acres from terrestrial to aquatic habitat by permanent flooding, and the temporary flooding of 851 acres by detention pools. Channel modification will temporarily disturb the vegetative cover on 26 acres of right-of-way. Alternatives include land treatment alone, restricted channel modification, flood plain management, or no action. (Gagliardi-Florida)
W75-07789

FLOOD CONTROL, SEABROOK MARINE LABORATORY, TEXAS,
Texas Parks and Wildlife Dept., Austin.
J. R. Stevens.
Completion Report, March 1975. 6 p. 2-248-C.

Descriptors: *Civil engineering, *Floodproofing, *Flood protection, *Flood control, *Flood damage, *Drainage systems, Waterproofing, Design flood, Project planning, Land forming, Land subsidence, Tidal effects, *Texas.
Identifiers: *Seabrook Marine Laboratory(TX).

A project was initiated in October 1974 to prevent the recurring problem of periodic flooding at the Texas Parks and Wildlife Department's Seabrook Marine Laboratory due to tide water. Up to six inches of water invade the first floor of the laboratory, principally during spring when high lunar tides are reinforced by strong onshore winds. A plan for solving the problem was chosen and specifications with cost estimates were developed. This report, with accompanying photographs, describes the engineering steps undertaken to stem future flooding. (NOAA)
W75-07829

SHORELINE PROTECTION GUIDE FOR PROPERTY OWNERS,
New York Sea Grant Advisory Service, Albany.
P. Sanko.
Insight No 2; NYSSGP-AS-75-001, (1975), 19 p.

Descriptors: *Erosion, *Erosion control, *Diversion structures, *Shore protection, Wind erosion, Waves, Tides, Dunes, Beach erosion, Littoral drift, Bulkheads, Sea walls, Retaining walls, Groins, Breakwaters, Vegetation regrowth, Great Lakes, Coasts.
Identifiers: *Saltwater coastlines, *Coastal processes, *Shore protection methods.

This guide reports the basic physical processes of erosion/deposition, such as wind, waves, currents, littoral drift, and tides. Common shore protection structures are explained, as well as their limitations and possible side effects. Bulkheads, revetments, seawalls, groins, breakwaters, protective beaches, dunes, and vegetative methods are examined. (NOAA)
W75-07835

8B. Hydraulics

HYDRAULIC DESIGN OF TWIN-CHAMBER TRICKLE IRRIGATION LATERALS,
Hawaii Univ., Honolulu. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 3F.
W75-07365

DETERMINATION OF SAND ROUGHNESS FOR FIXED BEDS,
Queen's Univ., Kingston (Ontario). Dept. of Civil Engineering.
J. W. Kamphuis.
Journal of Hydraulic Research, Vol 12, No 2, p 193-203, 1974. 5 fig, 1 tab, 10 ref.

Descriptors: *Roughness(Hydraulic), *Laboratory tests, *Waves(Water), *Sediment transport, *Sands, Turbulent flow, Velocity, Reynolds number.
Identifiers: *Nikuradse sand grain roughness.

The results of tests performed to determine Nikuradse's sand grain roughness were presented. This roughness parameter was expected to be used in work on shear stress and sediment transport below waves. Nikuradse assumed that the height of the roughness interfering with the flow in the pipe was equal to the diameter of the sand grain that was used to roughen the pipe. Although Nikuradse's sand grain roughness has become a standard method of describing roughness of a boundary in both pipes and channels, the results of the investigation indicated that this method may be incorrect and that some modifications should be incorporated. From these test results, it was concluded that for a natural bottom under conditions where d/D sub 90 (the ratio of water depth to the particle diameter so that 90 percent of the particles in grain size distribution is smaller) was large enough to warrant discussing the total bed rather than individual particles and where there was no viscous effect, the roughness height should be equal to twice the D sub 90 size of the bed particles. (Bhowmik-ISWS)
W75-07434

INTERACTION OF MULTIPLE JETS WITH AMBIENT CURRENT,
General Electric Co., Philadelphia, Pa. Re-entry and Environmental Systems Div.
For primary bibliographic entry see Field 5B.
W75-07467

SPARSITY ORIENTED ANALYSIS OF LARGE PIPE NETWORKS,
Waterloo Univ. (Ontario). Dept. of Systems Design.
M. Chandrashekar, and K. H. Stewart.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 101, No HY4, Proceedings Paper 11260, p 341-355, April 1975. 10 fig, 12 ref, 1 append.

Descriptors: *Water distribution(Applied), *Pipelines, Computers, *Hydraulics, *Algorithms, Mathematical studies, Pipe flow, Reservoirs, Head loss, Data processing.
Identifiers: *Sparsity oriented matrix, Jacobian matrix.

Water distribution systems of large metropolitan centers contain several hundred nodes and pipes and a number of pumping stations and reservoirs. The size and complexity of these networks require very efficient steady-state solution techniques for analysis in large digital computer systems. In most large-scale distribution systems, the actual nonzero entries in the Jacobian matrix of nodes are only 2 to 5% total entries. Sparsity is defined as the ratio of the actual nonzero terms present to the total possible terms. Although the Jacobian matrix is sparse, its inverse is generally full. The proposed method does not compute the inverse explicitly. It is based on graph theory, sparsity oriented matrix decomposition techniques, and Newton's method of iterative solution of nonlinear algebraic equations. A Fortran coded computer program was described. Examples were given of the application of this program to several large-scale networks. (Singh-ISWS)
W75-07468

CASCADE THEORY OF TURBULENCE IN A STRATIFIED MEDIUM,
City Coll., New York.
For primary bibliographic entry see Field 2L.
W75-07481

COMPUTING BACKWATER AT OPEN CHANNEL CONSTRICTIONS,
Geological Survey, Bay Saint Louis, Miss. Gulf Coast Hydroscience Center.
V. R. Scheider, and L. A. Druffel.
ASCE Proceedings, Journal of the Hydraulics Division, Vol 100, No HY5, p 705-707, May 1974. 1 tab.

Descriptors: *Discharge(Water), *Backwater, *Stage-discharge relations, Open channel flow, Hydraulics, Estimating, Forecasting.

Excellent agreement between backwater calculations is obtainable between the U.S. Geological Survey (USGS) method, the Federal Highway Administration (FHWA) method, and the actual data when the two predictive methods are properly applied to the computation of discharge through an open channel constriction. In general, the two methods work well for a wide range of field and laboratory conditions. They were developed with laboratory experiments, were carefully verified with peak flow discharge measurements in the field, and are checked with additional data whenever possible. (Knapp-USGS)
W75-07558

EFFECT OF STREAM TURBULENCE ON HEATED WATER PLUMES,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 5B.
W75-07587

A COMPUTER PROGRAM FOR ESTIMATING COSTS OF TUNNELLING (COSTUN),
Harza Engineering Co., Chicago, Ill.
F. T. Wheby, and E. M. Cikanek.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-228 740, $13.00 in paper copy, $2.25 in microfiche. Report No FRA-ORD-D-74-16, October 1973. 548 p, 49 fig, 18 ref, 8 append. DOT-FR-20007.

Descriptors: *Costs, *Tunnel design, *Estimated costs, *Computer programs, *Construction costs, *Tunnel construction, *Cost comparison, *Shafts(Excavations), Simulation analysis, Tunneling machines, Tunnel linings, Grouting, Structural shapes, Muck, Bids, Underground structures.
Identifiers: COSTUN computer program.

A computer program for estimating construction costs of tunnels and shafts is provided. The program COSTUN is intended for a variety of purposes: to provide cost estimates for planning and feasibility studies of tunnel projects; to permit the selection of a minimum cost route from a number of alternatives; to provide a means of identifying the minimum-cost construction methods for a variety of tunnel designs and site conditions; to provide a basis for comparison of alternative tunnel design features; and, in designed tunnels, to provide a check of the reasonableness of the engineer's estimate by comparison with the costs of the standard design built into the computer program. COSTUN is designed to duplicate the thought and reasoning process of an engineer. Twelve cost components are defined with each subdivided into labor, equipment, and material subcomponents: excavation setup, excavation, muck loading, muck transport, muck hoisting, muck disposal, supports, lining formwork, lining, grouting, pumping, and air conditioning. Input and adjustment procedures for the user are described for required input specifications for the project, for optional specifications and for external adjustments necessary for projects that do not fall within the range built into COSTUN. The program is only applicable to projects estimated at more than $1 million. (Becker-Wisconsin)
W75-07619

BANK AND CHANNEL PROTECTIVE LINING DESIGN PROCEDURES.
New York State Dept. of Transportation, Albany. Bureau of Soil Mechanics.
For primary bibliographic entry see Field 4A.
W75-07665

BEACH FORMS AND COASTAL PROCESSES,
Columbia Univ., New York. Teachers Coll.
For primary bibliographic entry see Field 2L.
W75-07715

THREE DIMENSIONAL TURBULENT DIFFUSION FROM POINT SOURCES OF POLLUTION IN AN OPEN CHANNEL,
Delaware Univ., Newark. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 5B.
W75-07723

GEOTHERMAL LEASING PROGRAM, VOL IV, APPENDIX I, COMMENTS ON DRAFT IMPACT STATEMENT AND PROPOSED REGULATIONS (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Department of the Interior, Washington, D.C.
Available from the National Technical Information Service, U.S. Dept. of Commerce, Springfield, Va. 22161, as EIS-CA-73-1681-F-4, $8.75 in paper copy, $2.25 in microfiche. October 24, 1973. 728 p, 6 map.

Descriptors: *Geothermal studies, *Wells, *Drilling, Steam, Electric power, Electric power production, Electric powerplants, Access routes, Byproducts, Grazing, Wastes, Waste disposal, Land subsidence, Wildlife, Recreation.
Identifiers: *Environmental Impact Statements.

The proposed action involves implementation of the Geothermal Steam Act of 1970 by the Secretary of the Interior. The plan entails promulgation of leasing and operating regulations pursuant to which the program is to be administered, and the leasing of federally-owned geothermal resources for development in three specific areas. Development of geothermal resources necessitates construction of access roads and well sites, drilling and testing of wells, conveyance of steam over short distances to electric power plants and by-product processing plants, construction and operation of electric power plants, by-products facilities, electrical transmission lines, and facilities for disposing of waste liquids. This action will result in preemption or restriction of land from uses such as wildlife habitat, recreational use, and grazing, as well as the modification of the terrain. Noise and noxious gas emissions may pose problems during testing and production. Other possible adverse effects include land subsidence due to production of fluids and increased seismicity due to production and reinjection of fluid wastes to producing zones. Comments were received from the departments of Agriculture, Army, Commerce, Health, Education and Welfare, and Interior and the Enviromental Protection Agency. (Gagliardi-Florida)
W75-07781

8C. Hydraulic Machinery

REVERSE OSMOSIS FOR SPACECRAFT WASH WATER RECYCLING, HIGH PRESSURE PUMP DEFINITION,
McDonnell Douglass Astronautics Co.-West, Huntington Beach, Calif.
R. E. Shook, and G. W. Wells.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-236 940, $4.75 in paper copy, $2.25 in microfiche. Report INT-OSW-RDPR-74-992, October 1974. 98 p, 4 tab, 23 fig, 28 ref. OWRT Contract 14-30-3062.

Descriptors: *Reverse osmosis, *Desalination, *Water quality, *Water temperature, *Pump testing, *Centrifugal pumps, Wa .te water treatment, *Pumps, Recycling, *Water reuse.
Identifiers: Gear pumps, Peripheral pumps, Jet pumps, Vane pumps, Rotor-screw pump, Axial-piston pumps, Radial-piston pump, Piston-valve type radial-piston pump, Wash water.

The principal objective was to continue the development of a high pressure space applicable reverse osmosis feed pump through the selection of a concept for detail design. Candidate pumping mechanisms suitable for small flow, high pressure water service were identified. Information on the efficiency, reliability, maintainability, mechanical complexity, sealing methods, valving concepts, lubrication requirements, development requirements, and projected costs was compiled from reference literature and vendor information. Summaries of the pertinent features of the various pump mechanisms were prepared. A matrix of selection criteria was prepared and a numerical comparison of the suitability of the various pump mechanisms was established. Positive displacement pumps of the vane or multi-piston types were determined to be best suited for the space vehicle RO system. Seal reliability, materials compatibility, and estimated development cost considerations resulted in the selection of a quintuplex radial piston pump for this application. (OWRT)
W75-07628

AN ARCTIC WATER SUPPLY SYSTEM,
Directorate of Construction Engineering and Design Engineering, Ottawa (Ontario).
For primary bibliographic entry see Field 5F.
W75-07684

NORTH BROWARD COUNTY, FLORIDA (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Environmental Protection Agency, Atlanta, Ga. Region IV.
For primary bibliographic entry see Field 5D.
W75-07787

CONNECTION FITTING FOR WATER TREATMENT APPARATUS,
For primary bibliographic entry see Field 5F.
W75-07808

8D. Soil Mechanics

USE OF AXISYMMETRIC INFILTRATION MODEL AND FIELD DATA TO DETERMINE HYDRAULIC PROPERTIES OF SOILS,
Utah State Univ., Logan. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2G.
W75-07466

BANK AND CHANNEL PROTECTIVE LINING DESIGN PROCEDURES.
New York State Dept. of Transportation, Albany. Bureau of Soil Mechanics.
For primary bibliographic entry see Field 4A.
W75-07665

8E. Rock Mechanics and Geology

TECTONIC STRESS DETERMINATIONS, NORTHERN PICEANCE CREEK BASIN, COLORADO,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 2F.
W75-07574

8F. Concrete

METHOD OF PROTECTION FOR SLOPES AND CRESTS OF RIVERS, CHANNELS, AND THE LIKE,
J. Estruco.
U.S. Patent No. 3,871,182, 2 p, 2 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 932, No 3, p 817, March 18, 1975.

Descriptors: *Patents, *Shore protection, *Erosion, Rivers, Slopes, Channels, Coasts, Shores, *Casings.

A method is disclosed for protecting slopes and crests of rivers, channels, and the like by mooring flexible and permeable tubular casings filled with fresh concrete. Tubular casings may be made of synthetic fibers, burlap, canvas, etc., and are simultaneously filled with fresh concrete while being placed at the foot of surfaces which must be protected. The tubular casing is lowered by gravity to its position by means of a series of ropes tied to the tubular casing at one of their ends with the other end of the ropes being secured to an element placed at the surface of the water. The ropes provide guides for the mooring of other casings similar to the above-mentioned one with the rolls, loops or rings or any other element being used for aligning purposes through which ropes of the first casing may pass so that the following casing necessarily are placed one over the other until the rolls appear at the surface of the water. (Sinha-OEIS)
W75-07819

8G. Materials

TECTONIC STRESS DETERMINATIONS, NORTHERN PICEANCE CREEK BASIN, COLORADO,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 2F.
W75-07574

PLASTIC PIPE IN COLDER CLIMATES,
Winnipeg Waterworks, Waste and Disposal Div. (Manitoba).
For primary bibliographic entry see Field 5F.
W75-07683

CHEMICAL CONTROL OF ROOTS,
Sacramento County Dept. of Public Works, Calif.
For primary bibliographic entry see Field 5D.
W75-07685

8I. Fisheries Engineering

LITTORAL DISTRIBUTION AND DRIFT OF SELECTED RIFFLE INSECTS,
Idaho Cooperative Fishery Unit, Moscow.
D. J. Peters.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-241 499, $4.25 in paper copy, $2.25 in microfiche. MS Thesis. May 1973. 56 p, 10 fig, 9 tab, 26 ref, append. OWRT A-035-IDA(1).

Descriptors: *Littoral drift, *Distribution, *Insects, *Rivers, Idaho, Benthic fauna, Currents(Water), Velocity, Biological communities, Mayflies, Caddisflies, Shores, Varieties.
Identifiers: *Insect drift, Clearwater River(Idaho).

Littoral drift and community distribution of aquatic insects were studied to assess the resiliency of specific species on subsequent diel water level fluctuations downstream from the Dworshak Dam on the Clearwater River, Idaho. Benthic samples were taken at 15, 30, and 45 cm littoral depths. Insect drift was taken on riffles at three distances from the shoreline in water depths of 30, 45 and 60 cm. Littoral variation in number and weight of riffle insects was shown to be affected by changes in depth and current velocity, interacting with the date and station of sampling. This differential distribution of riffle insects resulted in variation of the littoral community structure. In the non-fluctuating system, community diversity and diversity per individual decreased with increasing depths of 45 cm and current velocity to 1.1 m/sec. Fluctuating flows appear to reverse the order of community structure, i.e., community diversity and diversity per individual increase with increasing depth to 45 cm and current velocity to 1.1 m/sec. A flow reduction exponentially increased the number of drifting insects in zones adjacent to the exposed substrate on the shoreline. (Jones-Wisconsin)
W75-07356

REPRODUCTION AND DEVELOPMENT OF THE BAIKAL WHITEFISH COREGONUS LAVARETUS BAICALENSIS DYB. IN CONNECTION WITH THE PROBLEM OF ITS ARTIFICIAL BREEDING, (IN RUSSIAN),
Zh. A. Chernyaev.
Vopr Ikhtiol, Vol 13, No 2, p 259-274, 1973, Illus.

Descriptors: Lakes, *Fish, *Spawning, *Fish management, Breeding.
Identifiers: Coregonus-lavaretus-baicalensis, Pisciculture, USSR, *Whitefish(Baikal).

The region of reproduction of the Baikal whitefish Coregonus lavaretus baicalensis in Mukhor Bay of Lake Baikal, USSR is described. Data are given on the spawning conditions, migration routes, dynamics of the spawning run, and biological characteristics of the spawning school. The embryonic development and larval stages of the whitefish are described. The biotechniques of its artificial reproduction are considered. For artificial breeding it is necessary to establish the spawning grounds and determine the exact temperature parameters of development. Hydrclogic and hydrochemical observations of the spawning grounds should be made and experiments on hypophyseal injections, holding of spawners and regulation of the hatching time of larvae conducted.--Copyright 1974, Biological Abstracts, Inc.
W75-07711

PERIODICITY, IDENTIFICATION, AND CONTROL OF ALGAE IN MANAGED PONDS,
University of Southern Mississippi, Hattiesburg. Coll. of Science and Technology.
For primary bibliographic entry see Field 5C.
W75-07719

APPLICATION OF IMPORTED PERU FISH MEAL IN THE FISH FEED: II. STUDIES ON LIPIDS OF THE TEST DIETS, (IN JAPANESE),
Y. Shimma, and H. Shimma.
Bull Freshwater Fish Res Lab, Vol 22, No 1, p 73-98, 1972, Illus. English summary.

Descriptors: *Fish diets, *Rainbow trout, Lipids.
Identifiers: Brown lipids, Peru fish meal, *Japan.

Qualities of lipids of the test diets and supplemental extract which were fed to rainbow trout in the 1st paper of this series were checked. Although solvent treatment before feed preparation changed lipid contents of the meals, analytical data did not show much difference among their lipids. n-Hexane extractable lipids of Brown which were 30% of Brown lipids and were presumed to obstruct fish growth (Nomura et al, 1972) had relatively high carbonyl value and low TAB(2-thiobarbituric acid) absorbance ratio (450 micrometers/530 micrometers), and were contained originally in IV, V and VI fractions of Brown lipids. Remaining lipids after n-hexane extraction were major and further oxidized parts of Brown lipids of inferior qualities, but showed little ill effect on fish growth by Normura et al.--Copyright 1973, Biological Abstracts, Inc.
W75-07728

10. SCIENTIFIC AND TECHNICAL INFORMATION

10C. Secondary Publication And Distribution

A BIBLIOGRAPHY OF NUMERICAL MODELS FOR TIDAL RIVERS, ESTUARIES AND COASTAL WATERS,
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For primary bibliographic entry see Field 02L.
W75-07409

THE EFFECTS OF EFFLUENT FROM THE CANADIAN TEXTILE INDUSTRY ON AQUATIC ORGANISMS: A LITERATURE REVIEW,
Fisheries and Marine Service, Winnipeg (Manitoba).
For primary bibliographic entry see Field 05C.
W75-07644

OIL SPILL AND OIL POLLUTION REPORTS JULY 1974 - OCTOBER 1974,
California Univ., Santa Barbara. Marine Science Inst.
For primary bibliographic entry see Field 05G.
W75-07689

10F. Preparation Of Reviews

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